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A PILOT STUDY OF DRINKING WATER SYSTEMS AT BUREAU OF RECLAMATION DEVELOPMENTS

ENVIRONMENTAL PROTECTION AGENCY

JUNE 1973

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While the quality of the water delivered in the cities and towns to the citizens of the United States has received increasing attention in the last couple of years, very little information has been gathered concerning the quality of drinking water available to the public using water systems constructed at Federal facilities. This study is the second in a series on these water systems, the first of which concerned water systems serving recreational facilities operated by the Corps of Engineers. The purpose of this pilot study is to assess the water quality, construction, maintenance, operation, and surveillance of water systems around Bureau of Reclamation reservoirs. The findings of this report will hopefully focus more attention on these facets of water systems to helop improve the overall health protection of the public.

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WATER SUPPLY DIVISION
ENVIRONMENTAL PROTECTION AGENCY

June 1973

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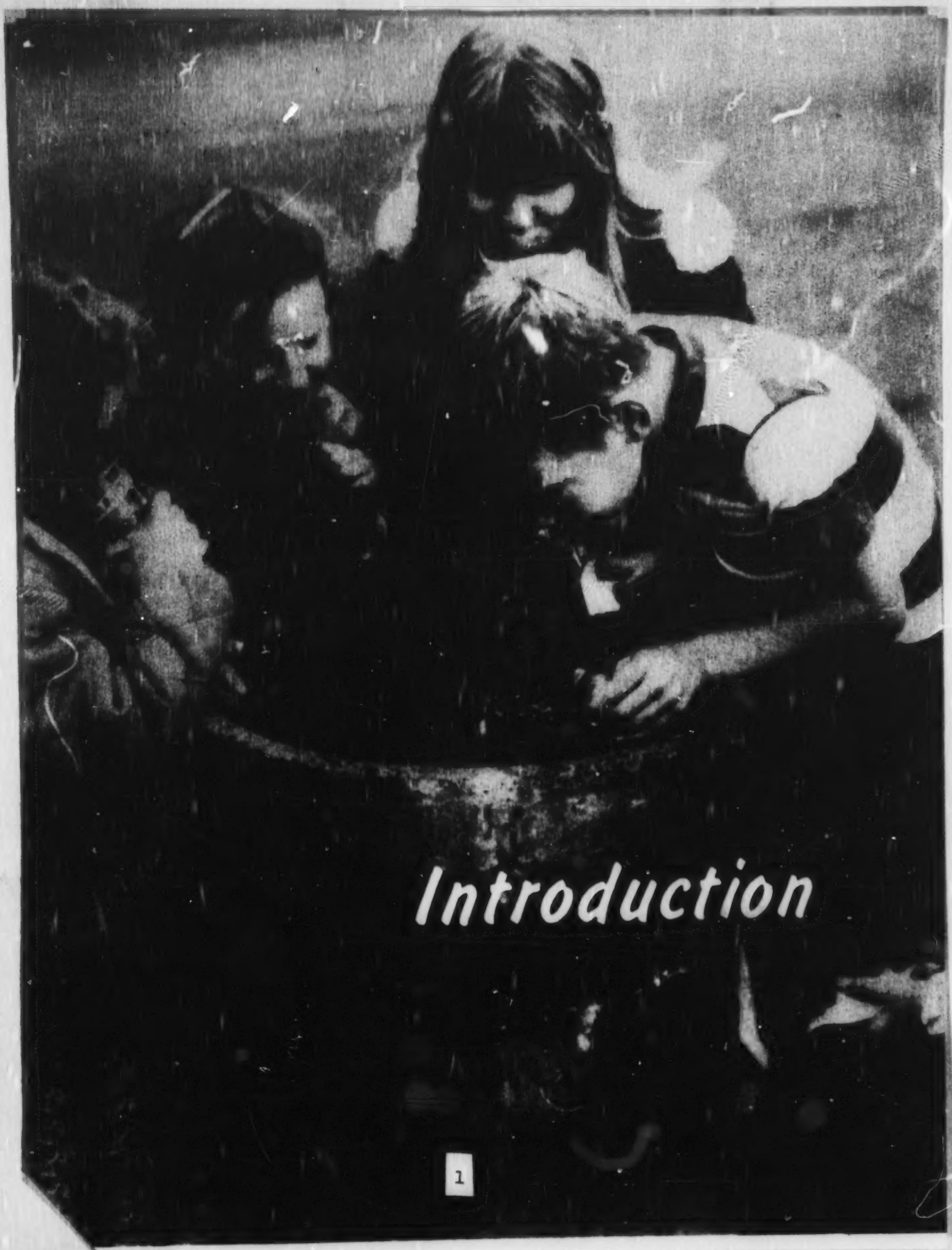

Introduction

INTRODUCTION

While the quality of the water delivered in the cities and towns to the citizens of the United States has received increasing attention in the last couple of years, very little information has been gathered concerning the quality of drinking water available to the public using water systems constructed at Federal facilities. This study is the second in a series on these water systems, the first of which concerned water systems serving recreational facilities operated by the Corps of Engineers.[1]

The purpose of this pilot study is to assess the water quality, construction, maintenance, operation, and surveillance of water systems around Bureau of Reclamation reservoirs. The findings of this report will hopefully focus more attention on these facets of water systems to help improve the overall health protection of the public.

The problem of waterborne disease outbreaks was addressed in a paper presented by Gunther Craun and Leland McCabe.[2] In this paper they reported that "the size of outbreaks in" nonmunicipal water "systems increased to 93 illnesses per outbreak during 1966-1970 ((the last 4 years of the reporting period), primarily due to a number of large outbreaks associated with recreational areas." The significance of this study can be seen in the fact that people using recreation facilities at Bureau of Reclamation projects number more than 55 million per year.

The Bureau of Reclamation and the State and local health departments having jurisdiction over the water supplies cooperated with the Water Supply Division of the Environmental Protection Agency to conduct a pilot study of 58 water systems around 26 Bureau of Reclamation reservoirs. These reservoirs represent a use of more than 12.3 million visitor-days per year. This report is based on field investigations that took place in October and November 1971.

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[1] "Sanitary Survey of Drinking Water Systems on Federal Water Resource Developments, A Pilot Study." Environmental Protection Agency. Washington, D.C. 50 pp. (1971).

[2] Craun, G.F., and McCabe, L.J., 1971. Review of the Causes of Waterborne Disease Outbreaks. American Water Works Association Annual Meeting, June 1971, Denver, Colorado.

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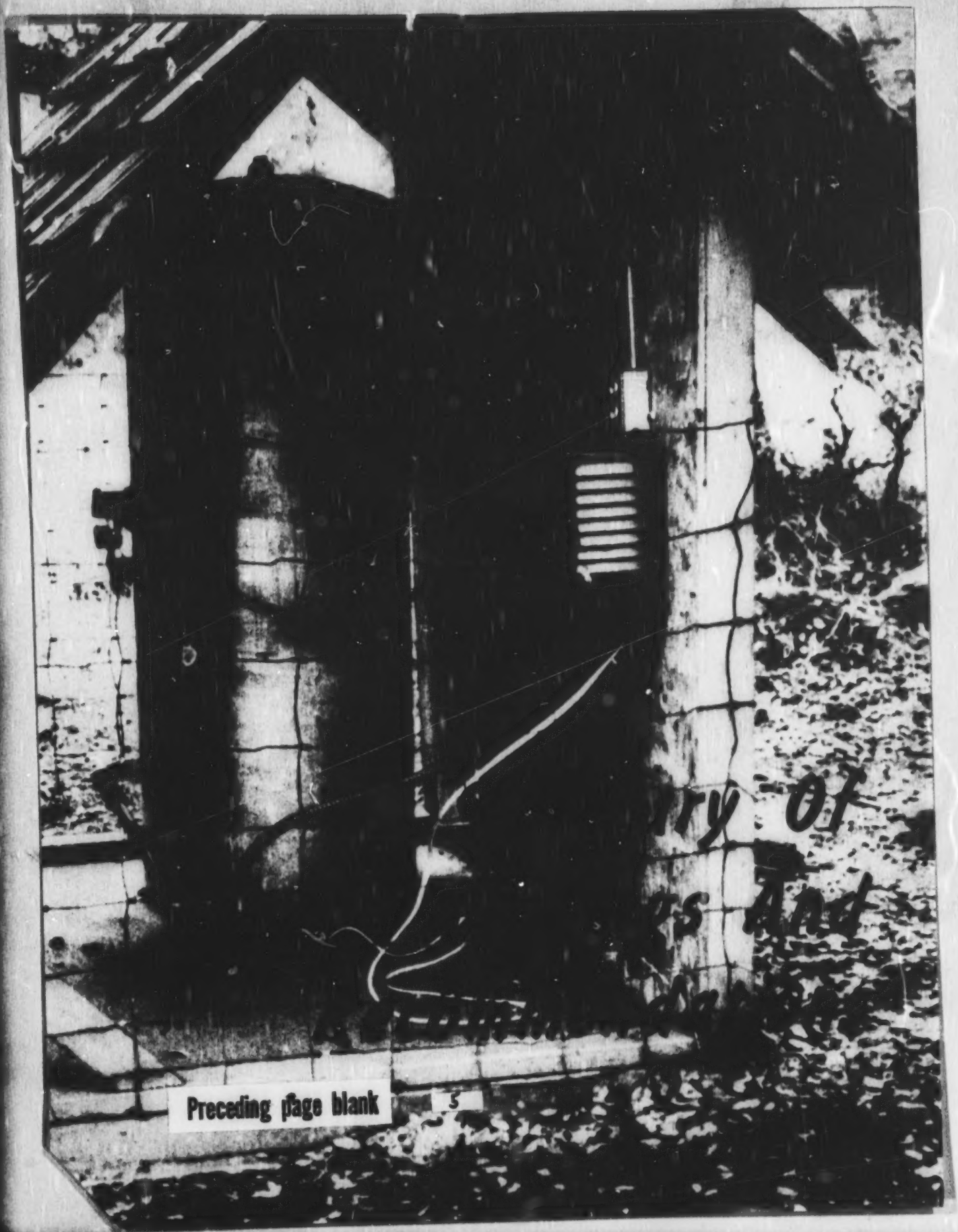
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SUMMARY OF FINDINGS AND RECOMMENDATIONS

This pilot survey included 58 drinking water supply systems at 26 Bureau of Reclamation reservoirs. The field work, completed in October and November of 1971, was divided between flood control and irrigation reservoirs in Kansas, and California, and along the Colorado River. At each water system surveyed, bacteriological samples of the distribution-system water were collected; also a bacteriological sample of the raw water was taken if the water was treated in any way. One bacteriological sample was collected at all hand-pumped wells. Samples of the water were also taken for a complete chemical and physical analysis, and chlorine residuals were measured at each sampling point. The distribution system pressure was also determined.

The findings of the study indicate that 33 (57 percent) of the systems delivered water that violated one or more constituent limits of the Drinking Water Standards; 14 systems (24 percent) did not meet at least one mandatory chemical or bacteriological limit; and seven of the systems (12 percent) were contaminated with coliform bacteria. The contaminated systems either did not practice disinfection or did not properly operate the disinfection equipment available. Only four (7 percent) of the systems practiced a bacteriological surveillance program that met the criteria in the Public Health Service Drinking Water Standards.

In order to rectify the problems highlighted by this study, the following general recommendations are offered:

1. The State and county governmental agencies are primarily responsible for the surveillance of the water systems. *These agencies should devote a higher priority to initiating and maintaining an acceptable program of bacteriological and chemical surveillance and to providing regular sanitary surveys of the water systems. The cost of an adequate surveillance program, which would typically include a complete chemical analysis of the water every third year, two bacteriological samples per month, and one sanitary survey each year, approaches $200 per system. This is the amount that State and county agencies should be spending in professional time, expenses, and laboratory costs to provide the needed surveillance.*

2. *The Bureau of Reclamation should maintain closer control of the water systems around their reservoirs. An identifiable organizational unit or specific positions in an existing office should be established at the regional office level, headquarters level, and the Bureau of Reclamation's Engineering and Research Center in Denver, Colo., with well defined responsibilities for water systems adjacent to the reservoirs. This group of personnel would control the centralized approval of construction plans for new systems, including water systems to be built by others, and should provide for the monitoring and operational review of all systems on Reclamation projects. Where water quality problems are indicated, the Bureau of Reclamation should promote the use of a better source of water and/or provision for additional treatment. The Bureau should make sure that those people responsible for the operation and maintenance of the water systems have the appropriate training to execute their responsibilities.*

The specific findings and recommendations of the study are:

Water Quality

1. Thirty-three (57 percent) of the systems delivered water that failed to meet some physical, chemical, or bacteriological constituent limit of the Drinking Water Standards. Thirty systems (52 percent) failed to meet at least one recommended limit, and six (10 percent) failed to meet at least one mandatory chemical limit. The water from 10 reservoirs where water is withdrawn for drinking purposes was analyzed for 12 specific chlorinated hydrocarbon insecticides. None of these insecticides was detected in any of the water supplies. The six systems failing mandatory chemical limits also failed to meet the constituent limits for selenium. One system failed to meet the chromium limit. *Those systems failing mandatory chemical limits should be provided with proper treatment equipment to produce water meeting the Drinking Water Standards, or another raw water source should be found.*

2. Bacteriological analysis of the distribution system water showed that four (16 percent) of the systems using ground water and three (11 percent) of the systems using surface water were contaminated. Where contamination was found, the appropriate authorities were notified immediately. *To prevent bacteriological contamination of the source, improved source protection is necessary. Disinfection should be a mandatory requirement for all systems using surface water. Other treatment should be employed as necessary to ensure that the turbidity level does not fail to meet the limit established in the Drinking Water Standards. Disinfection should be a mandatory requirement for all drinking water systems using ground water unless a history of satisfactory bacteriolgical sampling and sanitary surveys has been developed.*

Facilities and Operation

3. Of the 24 wells studied, four (17 percent) lacked adequate protection against surface contamination. The

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protection for four other wells could not be determined because of the absence of records concerning their construction. *The source protection of a water system is vital to the maintenance of a safe water supply. More attention should be given to proper source protection in well construction.*

4. Cisterns should be replaced by other water systems if at all possible because of the many avenues of contamination of cistern water. If the use of cisterns is continued, the water should be chlorinated when placed in the cistern and daily chlorine residual determinations (of water in the cistern) should be taken to assure that a chlorine residual is maintained.

5. Thirty-four systems (59 percent) were chlorinated to disinfect the water. Six (17 percent) of these systems did not have a chlorine residual in the distribution system or storage tank, and 24 (67 percent) of the systems did not have a chlorine residual at the dead ends of the distribution lines. *Daily inspection of the chlorine feed equipment and daily records of the chlorine residuals should be maintained. Chlorine residuals should be present at the ends of the distribution systems.*

6. Operation and control were not adequate at 31 (53 percent) of the water systems studied. Treatment equipment and/or chlorine residuals were not checked daily at these systems. The study shows that while personnel are available for water system maintenance, many of the individuals responsible for the water systems do not have a full knowledge of what they should be doing and the reasoning behind these duties. *The Bureau of Reclamation should ensure that all persons responsible for the operation of a water system on Bureau of Reclamation projects are adequately trained.*

Surveillance

7. Records of the bacteriological surveillance for the 12 months preceding the study were investigated for each water system. The results of this investigation show that 54 (93 percent) of the water systems surveyed were not sampled with a frequency meeting the Drinking Water Standards. Records could not be found for any bacteriological testing within the preceding 12 months at 23 (40 percent) of the water systems studied. Ten water systems (17 percent) had bacteriological samples that were contaminated with coliform bacteria during at least 1 month in the past year, and eight systems (14 percent) showed contamination in 2 months or more. There is great need to expand the sampling procedures. *A bacteriological sampling program that will meet the minimum requirements of the Drinking Water Standards should be required at each system. This program should be continued at all times the system is operational.* The results of the study showed that surveillance is not provided at many systems during the winter months, even though sportsmen and employees may continue to use the water system.

8. Chemical surveillance, especially at well systems, was very inadequate. *The water from all drinking water systems should be tested for all chemical constituents listed in the Drinking Water Standards before the water is made available to the public. Regular chemical analysis is recommended for all systems served by a surface water source, and periodic chemical analysis is recommended for systems supplied by wells when there is reason to believe the chemical quality may be deteriorating.*

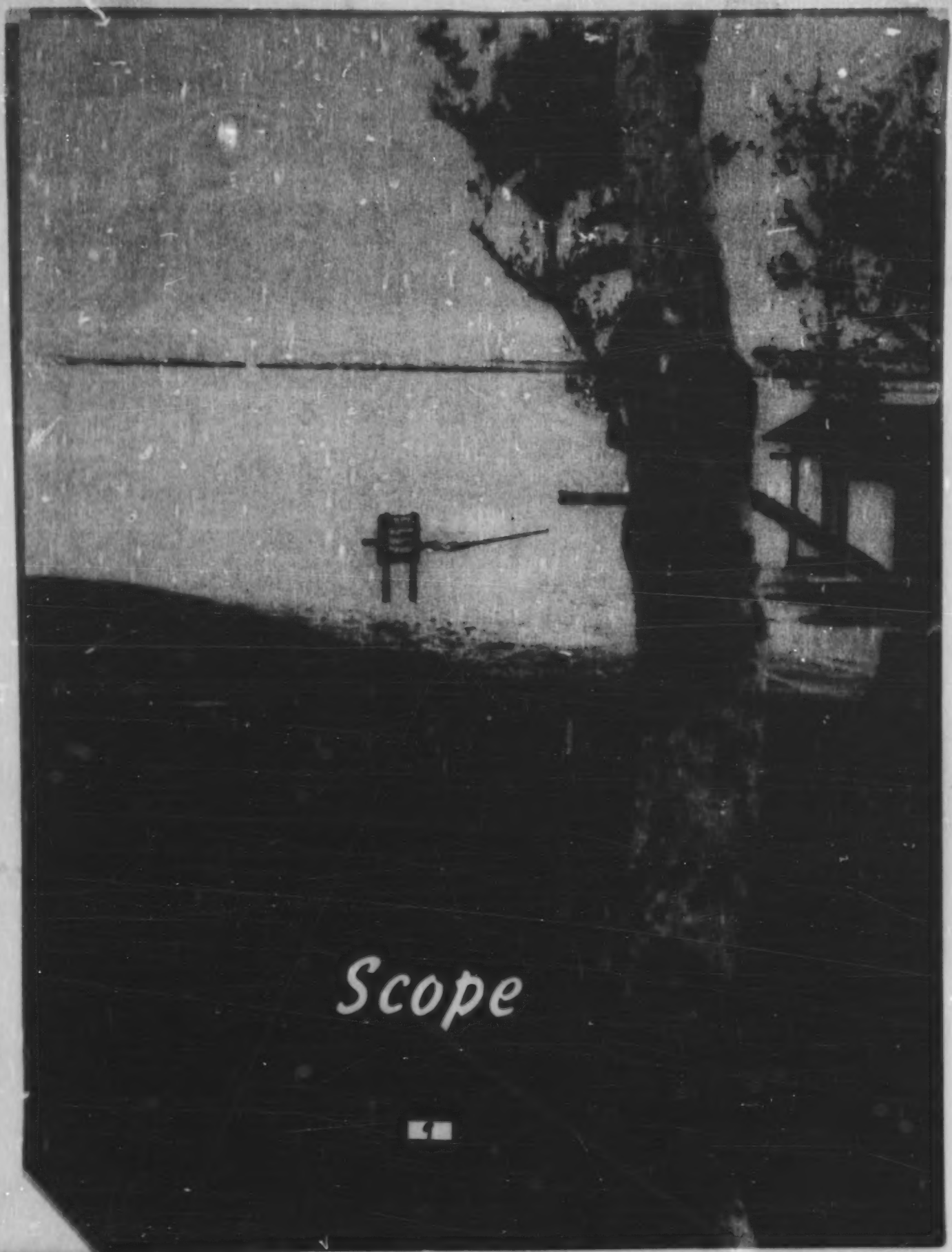
9. The sanitary deficiencies found by this study could have been identified and corrected with a program of frequent and thorough sanitary surveys by the appropriate State or county governmental agency. *Yearly sanitary surveys of and continuing attention to each water system should be provided. For water systems that are not operated during the winter months, the sanitary surveys ideally would be performed when the system is placed in operation in the spring. No water system should be placed in operation until two satisfactory bacteriological samples have been obtained.*

The preceding recommendations address problems that can be best solved by the Bureau of Reclamation and the State and local governments. The following recommendations relate to problems that should be considered by appropriate Federal agencies and others having broad water-supply responsibilities and interests.

1. The problems inherent in the operation of small water systems at recreational areas are unique. One example is the extreme fluctuation in use over a period of a week. *Criteria and standards should be developed for the construction, operation, and health surveillance of small public drinking water systems serving recreational areas. There is a need to reevaluate the bacteriological sampling frequency as required by the Drinking Water Standards.*

2. Chlorination as a means of disinfection for small, isolated water systems has several problems. The feed system can easily become inoperable, the chlorine residual dissipates during periods of low use, and needed maintenance and daily inspections are not always performed. *In order to rectify some of the problems in disinfection by chlorination, alternative means of disinfection should be reviewed.*

3. Since this project was only a pilot study that involved isolated areas, the results indicate the need for further study. *This study should be extended to other Federally related small water systems to fully assess the ability of these systems to continuously produce safe and esthetically pleasing water.*


Scope

SCOPE OF SYSTEMS STUDIED

The Bureau of Reclamation has 134 projects in the 17 Western States. These projects include 280 storage dams and 136 diversion dams. Boating, fishing, and swimming in reservoirs, and camping, hiking, picnicking, and sightseeing are provided for, and are considered a part of the justification for the construction of Reclamation lakes. People using recreation facilities at these projects number more than 55 million per year, and the number is steadily increasing.[1]

This pilot study covered 26 Bureau of Reclamation reservoirs and 58 drinking water supply systems at these reservoirs. A water supply system as defined by this study included the works and auxiliaries for collection, treatment, and distribution of water from the sources of supply to the free-flowing outlet of the distribution system.

[1] From "Answering Your Questions About Reclamation," Bureau of Reclamation, GPO:1970 0-381-322

TABLE 1.—Summary of reservoirs included in study

Reservoir	Calendar year completed	Visitor days (1971)	Source of visitors percent	
			Local	Other
Kansas:				
Glen Elder	1969	106,911	65	35
Lovewell	1957	154,660	60	40
Norton	1964	136,232	60	40
Kirwin	1955	219,619	75	25
Cedar Bluff	1951	153,435	70	30
Webster	1956	95,242	75	25
Total, Kansas		1,482,044	77	23
California:				
Berryessa	1957	1,845,570	5	95
Contra Loma	1967	185,965	90	10
Stony Gorge	1928	Unknown		
Red Bluff	1968	5,049	90	10
Folsom	1956	2,068,073	80	20
Camp Far West	1964	Unknown		
Merle Collins	1963	Unknown		
Millerton	1942	573,754	80	20
San Luis	1967	117,438	40	60
Los Banos	1967	21,613	80	20
O'Neill	1967	124,406	60	40
Woollomes	1959	154,501	85	15
Cachuma	1953	996,880	27	73
Casitas	1959	1,367,596	25	75
Amador	1965	Unknown		
Jenkinson	1955	235,501	32	68
Total, California		7,696,346	43	57
Lower Colorado River:				
Mead	1936	642,951	10	90
Mohave	1950	25,315	10	90
Havasu	1938	1,787,795	10	90
Imperial	1938	668,046	28	72
Total, Colorado River		3,124,107	14	86
Grand Total		12,302,497	40	60

Source: Data from the Bureau of Reclamation.

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The study was centered in three geographic areas: (1) Kansas, (2) California, and (3) the lower Colorado River (bordering the States of Nevada, Arizona, and California). Table 1 is a summary of those reservoirs sampled. Of the 26 reservoirs, six were in Kansas, 16 in California, and four along the Colorado River.

As shown by Table 1, the 26 reservoirs had a visitation rate of 12.3 million visitor days per year. Twelve percent of this visitation occurred at the Kansas reservoirs, 63 percent at the California reservoirs, and 25 percent at the Colorado River reservoirs. The California and Colorado River reservoirs had the majority of their visitors from nonlocal sources. Overall, 60 percent of the visitor-days (7.4 million visitor-days) involved in this study were nonlocal. Therefore, the quality of drinking water available to visitors can affect a wide cross section of the population. The location of each reservoir studied is shown in Figures 1, 2, and 3.

TABLE 2.–Summary of water-system types

Area	Number of systems by type			Total
	Surface water	Ground water	Wholesale finished water	
Kansas	0	17	1	18
California	24	6	4	34
Colorado River	4	2	0	6
Total	28	25	5	58

Table 2 summarizes the water systems studied by three categories: (1) the source of raw water is the lake or river associated with the dam (surface water); (2) the raw water comes from a well or spring (ground water); or (3) wholesale finished water is used in the system. In the ground water category, only one spring was studied. Wholesale finished water is defined as water treated at another location and piped or hauled by truck to the distribution system. The source and treatment of this water is beyond the scope of this study and no investigation of the wholesale water sources was attempted.

All systems studied in Kansas had wells as raw water sources. The water at Glen Elder Reservoir was purchased from the city of Glen Elder and piped to the reservoir. A total of 18 water systems were studied in Kansas.

In California, 34 water systems were surveyed, of which 24 were surface sources and one was a spring. Of the four systems using wholesale finished water, three were located at Lake Millerton with "piped-in" water. The other supply using wholesale finished water was at Contra Loma where the water is hauled by truck to the reservoir from the nearby town of Antioch. All systems along the Colorado River used surface water for their water source except for two wells around Imperial Reservoir.

The water treatment practices of the systems studied are enumerated in Table 3. Nineteen of the systems (36 percent) provided no treatment for the water, including one system using surface water as a source. No treatment other than disinfection was found at any ground water system. Seven (28 percent) of the 25 ground water systems disinfect their water. Twenty-eight (53 percent) of the water systems used surface water as a raw water source. Of these systems, nine (32 percent) provided only disinfection for the water, and 18 (65 percent) provided both disinfection and clarification as water treatment. In every case, the method of disinfection used was chlorination, usually with an automatic feeder

TABLE 3.–Summary of water treatment of systems surveyed

Treatment	Type of system (number)*		System totals	
	River or lake water	Spring or well water	Number	Percent
Do not disinfect or clarify	1	18	19	36
Disinfection only	9	7	16	30
Clarification† and disinfection	18	0	18	34
System totals (by number)	28	25	53	100

* Distributors of wholesale water not considered (5 systems).
† Clarification means coagulation, sedimentation, and/or filtration.

and either chlorine gas or a hypochlorite solution. One supply at Webster Reservoir depended on manual chlorination (pouring bleach into tanks by hand) to maintain a chlorine residual. Rapid sand filters or diatomaceous earth filters were used as the sole form of clarification at nine (50 percent) of those systems practicing clarification. The other 50 percent of these systems practiced some form of coagulation. Eighteen (34 percent) of the water systems sampled practiced both clarification and disinfection.

Reservoirs in Kansas

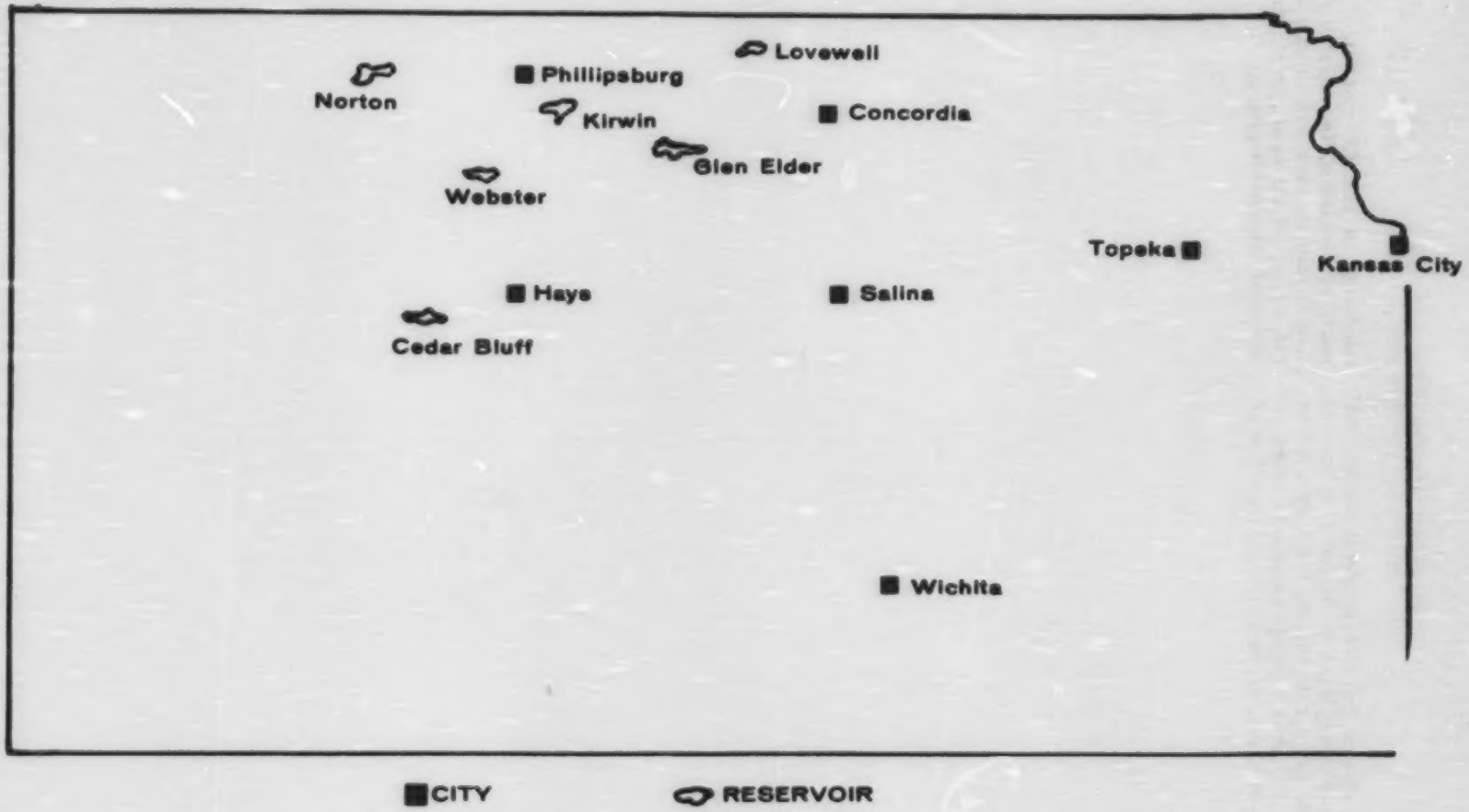

Figure 1

Reservoirs in California

Figure 2

Reservoirs Along the Colorado River

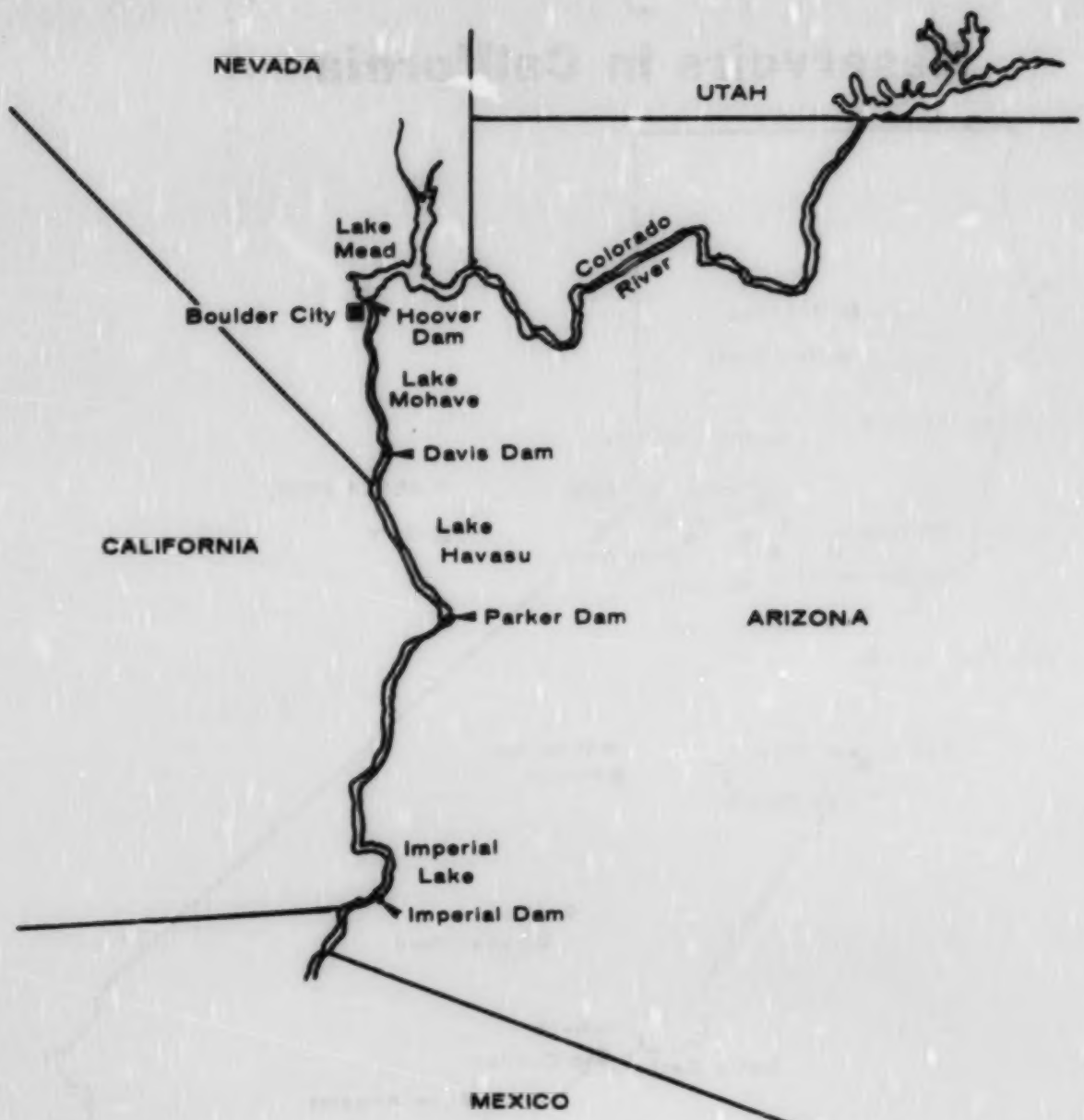

Figure 3

Evaluation
Criteria

EVALUATION CRITERIA

The water systems evaluated by this study were assessed from three different but related approaches:

1. A sanitary survey of the source, treatment and distribution facilities, and operation of the systems was conducted by engineers from the Water Supply Division of EPA.
2. Analysis of the water quality was performed by EPA Water Supply Division laboratories.
3. The results of the bacteriological surveillance of each system for the 12 months preceding the study were evaluated.

TABLE 4.—Criteria for evaluating bacteriological, chemical, and physical quality of water systems studied

Recommended Limits*			Mandatory Limits*		
Constituent †	Limit		Constituent ‡	Limit	
Arsenic	0.01	mg/l	Arsenic	0.05	
Boron	1	mg/l	Boron	5	mg/l
Chloride	250	mg/l	Cadmium	0.01	mg/l
Color	15	s.u.	Chromium	.05	mg/l
Copper	1	mg/l	Coliform organisms	Fails standards in any one month if:	
Cyanide	0.01	mg/l		a. Arithmetic average of samples collected greater than 1 per 100 ml;	
Iron	0.3	mg/l			
MBAS	0.5	mg/l			
Manganese	0.05	mg/l			
Nitrate	45	mg/l			
Sulfate	250	mg/l			
Total dissolved solids	500	mg/l			
Turbidity	5	s.u.		b. Two or more samples (5 percent or more if more than 20 examined) contain densities more than 4/100 ml.	
Zinc	5	mg/l			
			Cyanide	0.2	mg/l
			Lead	0.05	mg/l
			Mercury §	0.002	mg/l
			Selenium	0.01	mg/l
			Silver	0.05	mg/l
			Aldrin §	0.001	mg/l
			Lindane §	0.005	mg/l
			Chlordane §	0.003	mg/l
			DDT (p,p') §	0.05	mg/l
			Dieldrin §	0.001	mg/l
			Endrin §	0.0005	mg/l
			Heptachlor §	0.0001	mg/l
			Heptachlor-epoxide §	0.0001	mg/l
			Methoxychlor §	1.0	mg/l
			Toxaphene §	0.005	mg/l

*1962 U.S. Public Health Service Drinking Water Standards.
†If the concentration of any of these constituents is exceeded, a more suitable supply should be sought.
‡The presence of these substances in excess of the concentrations listed shall constitute grounds for the rejection of the supply; therefore, their continued presence should be carefully measured and evaluated by health authorities and a decision should be made regarding corrective measures or discontinuing use of the supply.
§Proposed for inclusion in the Drinking Water Standards.

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Water Quality Criteria

The water quality was judged by the following three criteria:

1. No constituent limit of the PHS Drinking Water Standards[1] was met.
2. At least one "recommended" constituent limit was not met, but no "mandatory" constituent limit was not met.
3. At least one "mandatory" constituent limit was not met.

Table 4 lists the constituents for which an analysis was conducted. The limits are taken from the 1962 USPHS Drinking Water Standards, except for mercury and the 12 chlorinated hydrocarbon insecticides. These limits were taken from a proposed revision to the 1962 Standards. Appendix A summarizes the significant changes that are proposed.

Facilities Criteria

Source, treatment, operation, and distribution facilities were judged either:

1. To be essentially free from major deficiencies, or
2. To be deficient in one or more of the following (where applicable):
   a. Source protection
   b. Control of disinfection (if practiced or if purchasing chlorinated water)
   c. Control of clarification (if clarification practiced)
   d. Pressure (20 psi) in the distribution system

Bacteriological-Surveillance Program Criteria

The bacteriological-surveillance program over the water supply system was judged on the following criteria:

1. Collection of the required number[2] of bacteriological samples during the period of the year the water system is in operation. This required number is based on the resident population using the water system with a minimum of two samples per month.
2. Meeting the bacteriological quality standard as stated in the Drinking Water Standards.

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[1] "1962 USPHS Drinking Water Standards." PHS Publication No. 956, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 61 pp. (1962).

[2] Ibid., pp. 3-6.

Proceed
27

PROCEDURES

Field Survey

The water systems to be studied were agreed upon in meetings with regional and field personnel of the Bureau of Reclamation in McCook, Nebr., Sacramento, Calif., and Boulder City, Nev. An effort was made to select States or geographical areas where diverse water systems would probably be found. The determination of which systems would be studied in a geographical area was influenced by the time necessary to transport the water samples to the laboratories. Each system was given advance notice and an explanation of the survey through letters from the Bureau of Reclamation or the Water Supply Division to a Bureau of Reclamation contact at each reservoir. Appointments for the field survey were made from 1 to 4 weeks in advance of the proposed visit.

The field surveys were performed by engineers from the regional and headquarters offices of the Water Supply Division of the Environmental Protection Agency. State and local health officers were invited to take part in the inspection and in some cases they did participate. This inspection included a sanitary survey of the source, treatment plant, and distribution system of the water system as well as an examination of the bacteriological records of the system for the year prior to the survey. The results of the sanitary survey were recorded on PHS and ECA standard forms and other forms developed especially for use in this study. Field determinations of the pH (using phenol red indicator), pressure, and chlorine residual at chlorinated systems (using the orthotolidine method) were made at each point where a water sample was taken.

The summary of findings for each water system is shown in appendix B. These individual sheets were circulated to the appropriate water systems, health officers, and Bureau of Reclamation personnel when completed.

Sampling Program

During the field study, the following samples were taken at each water system:

1. *Raw Water*

   Where possible, one bacteriological sample was taken of the raw water before treatment. This sample was omitted if the water in the system did not undergo any treatment. In many systems, a raw water sample could not be obtained because of the physical arrangement of the piping system.

2. *Finished Water.*

   a. A 1-gallon grab sample was taken and sent to the EPA Northeast Water Supply Laboratory in Narragansett, R.I., to be analyzed for the following:

Boron	Selenium
Chloride	Sulfate
Color	Total dissolved solids
pH	Turbidity

   b. A 1-quart grab sample was taken and preserved by the addition of 1 ml of a 20,000 ppm solution of mercury (2.71grams $HgCl_2$ per 100 ml) in the field. The sample was sent to the EPA Laboratory in Narragansett, R.I., and analyzed for nitrates and MBAS (methylene blue - active substances).

   c. A 1-quart sample was taken and preserved in the field by the addition of 1 1/2 ml of 2N sodium hydroxide solution. The sample was sent to the Narragansett, R.I., Laboratory and analyzed for the presence of cyanide.

   d. A 1-quart sample was taken and preserved in the field by the addition of 1 1/4 ml of concentrated nitric acid. The sample was sent to the Water Supply Laboratory in Cincinnati, Ohio, to be analyzed for the presence of the following trace metals:

Arsenic	Lead
Barium	Manganese
Cadmium	Mercury
Chromium	Nickel
Cobalt	Silver
Copper	Zinc
Iron	

   e. Bacteriological samples were taken at a rate of at least 10 percent of the number required by the Drinking Water Standards (based on the resident population served by the system) or generally a minimum of two from any water supply. At some supplies, only one sample was taken from the system (i.e., hand pumps).

   These samples were taken at different points in the distribution system, one close to the treatment plant and one near the end of the distribution line. They were taken from hosebibs in camping areas, restrooms, or drinking fountains. A bacteriological sample was taken only after flushing for at least 30 seconds; the chemical samples were taken after the bacteriological samples.

   Bacteriological samples were collected in 8-ounce sterile, plastic, wide-mouth, screw-capped bottles that contained 0.2 ml of a 10-percent sodium thiosulfate solution. These

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samples were refrigerated after collection and during transportation to the Northwest Water Supply Laboratory in Gig Harbor, Wash. The time between collection and the start of the analysis of the samples did not exceed 30 hours.

f. A 1-gallon grab sample was taken at 10 of the surface supplies where pesticide contamination was most likely to be a problem and sent to the Gulf Coast Water Supply Laboratory at Dauphin Island, Ala., for pesticide analysis.

The water samples were analyzed for the following chlorinated insecticides:

Aldrin	Dieldrin
Lindane	Endrin
Chlordane	Heptachlor
DDD	Heptachlor-epoxide
DDE	Methoxychlor
DDT (p, p[1])	Toxaphene

Laboratory Procedures

The bacteriological quality examination procedures used in this study were those listed in *Standard Methods.*[1] The membrane filter procedure was used to examine water samples for total coliforms. The procedure involved using M-Endo MF broth and incubating at 35°C for 20-24 hours. Coliform colonies detected were verified further by transfer to phenol red lactose broth for 24 and 48-hour periods at 35°C incubation. All positive phenol red lactose broth tubes were then confirmed in brilliant green lactose broth at 35°C for verification of total coliforms and in EC medium at 44.5°C for detection of fecal coliforms.

A general bacteriological population count was also made on all bacteriological samples. Sample portions of 1 ml and 0.1 ml in plate count agar (Tryptone-Glucose-Yeast Agar) were incubated 48 hours at 35°C for this examination.

The laboratory procedures for the chemical and physical analyses of the water samples were those of *Standard Methods,*[2] except for the use of a variation of the potentiometric titration procedure for the chloride analysis. Gas chromatography was used for the pesticide analysis.

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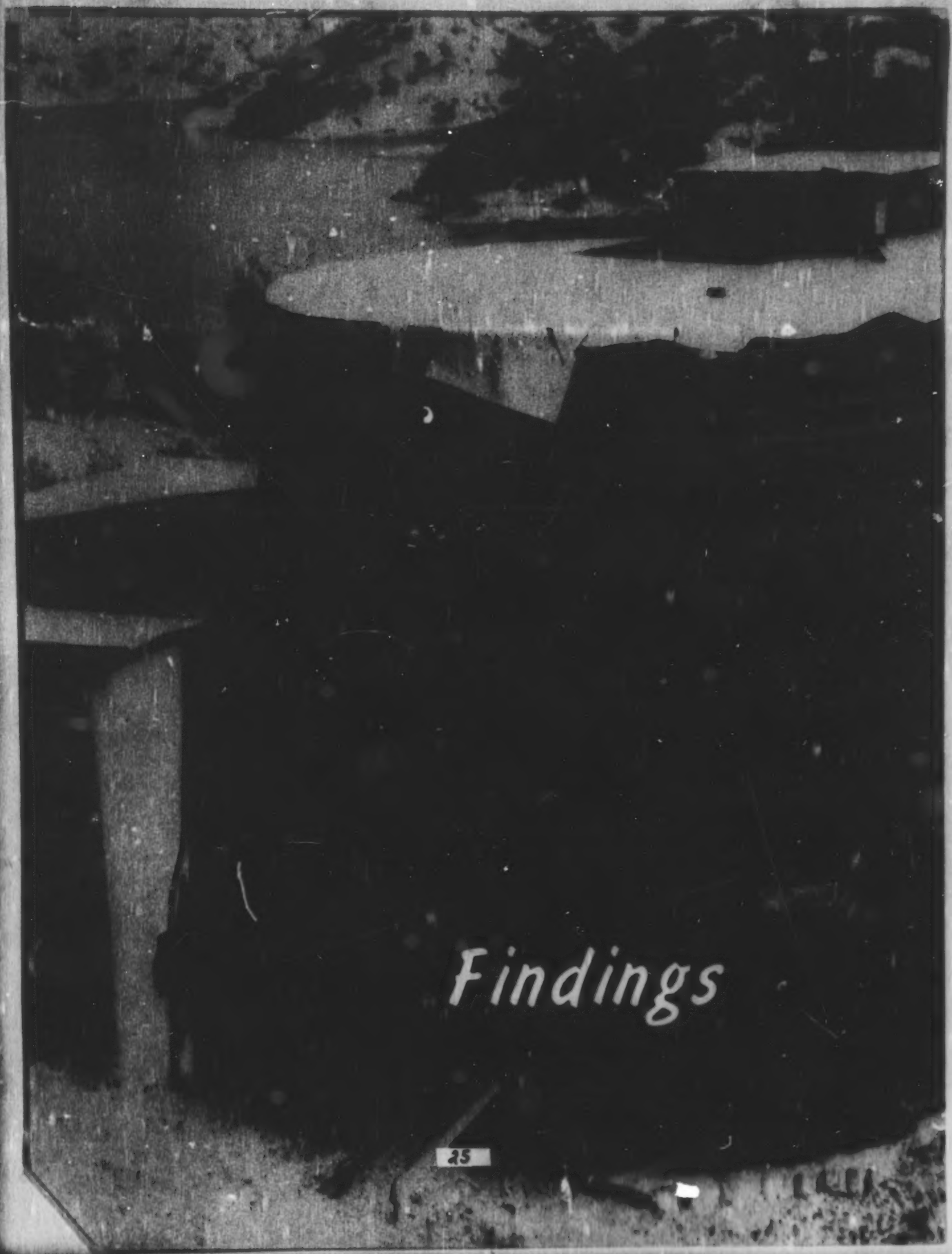
[1] *Standard Methods for the Examination of Water and Wastewater,* 13th ed., (APHA, AWWA, WPCF. American Public Health Association. New York, N.Y. 769 pp. (1971).

[2] Ibid.


Findings

FINDINGS

Water Quality

Thirty-three of the 58 water systems studied did not meet one or more of the constituent limits of the Drinking Water Standards. Thirty-one systems failed to meet at least one recommended limit and 14 systems distributed water that failed to meet at least one mandatory chemical or bacteriological limit. These figures are shown in graphic form in Figure 4. Figure 5 shows the relative numbers of each limit that was not met.

FIGURE 4.–Number of systems failing to meet standards

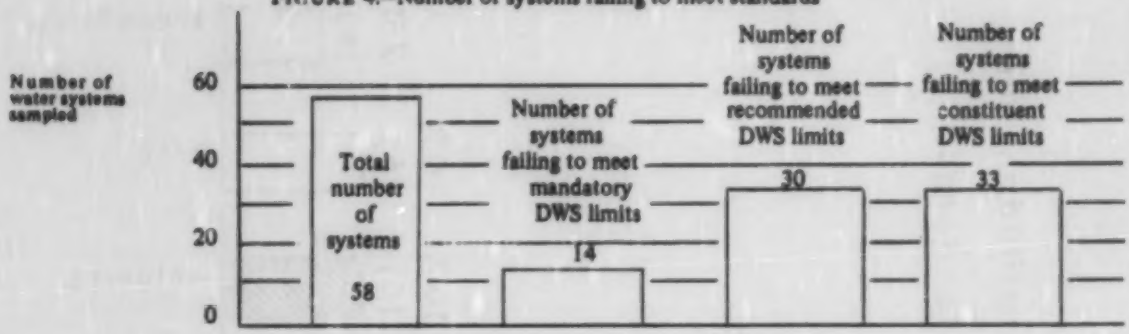


TABLE 5.–Public Health Service Drinking Water Standards limits not met

Constituent	Kansas (18)		California (34)		Colorado River (6)	
	Number	Percent	Number	Percent	Number	Percent
	Recommended limits not met					
Color	2	11	0	0	0	0
Iron	6	33	1	3	0	0
Manganese	3	17	1	3	0	0
Nitrate	3	17	1	3	0	0
Sulfate	4	22	1	3	6	100
TDS	14	78	2	6	6	100
Turbidity	4	22	2	6	1	17
Zinc	3	17	2	6	1	17
	Mandatory limits not met					
Chromium	1	6	0	0	0	0
Coliform organisms	2	11	4	12	1	17
Selenium	6	33	0	0	0	0

Table 5 is a summary of those limits which were not met. The Drinking Water Standards limits for total dissolved solids (TDS) and sulfate were not met in all six systems sampled along the Colorado River. Four of these six systems used water from the Colorado River as a water source while two supplies used wells. These two wells were at Imperial Reservoir and are 80 to 100 feet deep. Water flows into the wells at various levels and could be lake water. Table 6 shows the maximum concentrations for the limits exceeded.

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Figure 5

Systems Failing to Meet a Constituent Limit of the Drinking Water Standards

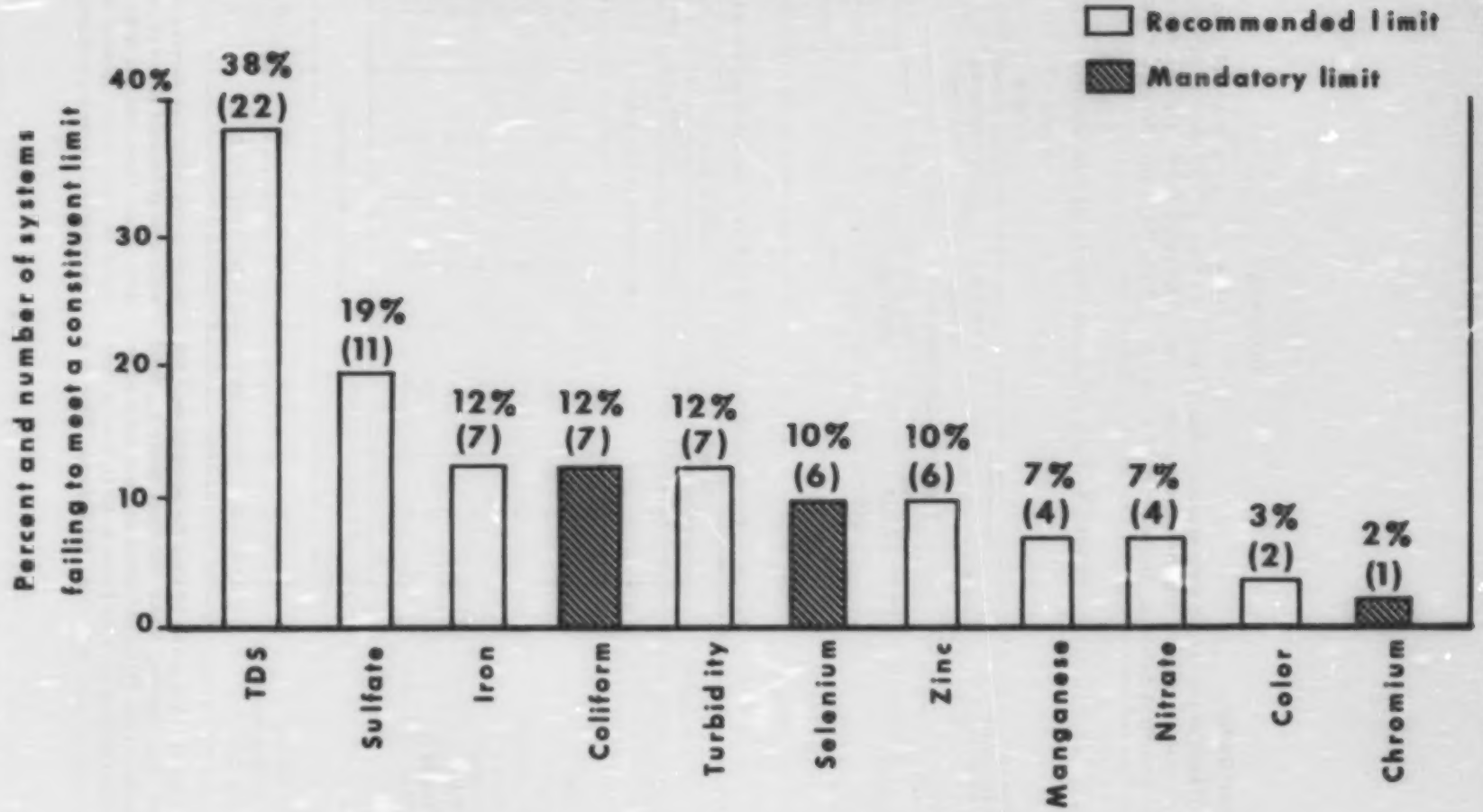

TABLE 6.–Maximum concentration found in physical and chemical constituents failing to meet limits for systems surveyed

Constituent	Concentration
Chromium	0.067 mg/l
Color	100 s.u.
Iron	5.53 mg/l
Manganese	1.3 mg/l
Nitrate	82.9 mg/l
Selenium	0.041 mg/l
Sulfate	575 mg/l
Total dissolved solids	1,775.5 mg/l
Turbidity	195 s.u.
Zinc	18.3 mg/l

The water systems in Kansas proved to have the highest rate for not meeting the Drinking Water Standards. Fourteen (78 percent) of these systems failed to meet the TDS standard. High levels of iron, manganese, turbidity, sulfate, and nitrate were also found in these systems producing objectionable water. Six (33 percent) of the wells in Kansas produced water that failed to meet the mandatory limit for selenium. The maximum concentration found in physical and chemical constituents failing to meet the limits is presented in Table 6.

Table 7 shows those systems failing to meet the Drinking Water Standards as a function of source. Most of the systems failing to meet Drinking Water Standards limits depended on ground water. Most of the problems with the surface water came from systems using the Colorado River, due to its mineral content. Four (17 percent) of the systems using wells as a raw water source were bacteriologically contaminated, while three (11 percent) of the systems using surface water showed coliform contamination. The system using spring water and those systems using wholesale finished water were free from coliform contamination.

Three of the water systems used cisterns filled with water treated elsewhere and delivered by truck to a storage tank. Gross bacteriological contamination was found in one of these cisterns.

TABLE 7.–Water systems surveyed failing to meet drinking water standards limits, by source

Constituent	Well (24)		Spring (1)		Surface (28)		Wholesale finished water (5)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
	Recommended limits							
Color	2	8	0	0	0	0	0	0
Iron	7	29	0	0	1	4	0	0
Manganese	3	13	0	0	1	4	0	0
Nitrate	3	13	0	0	0	0	0	0
Sulfate	6	25	0	0	5	18	0	0
Total dissolved solids	17	71	0	0	5	18	1	20
Turbidity	6	25	0	0	1	4	0	0
Zinc	4	17	1	100	1	4	0	0
	Mandatory limits							
Chromium	1	4	0	0	0	0	0	0
Coliform organisms	4	17	0	0	3	11	0	0
Selenium	5	21	0	0	0	0	1	20

Table 8 compares water systems in Kansas that take water from similar types of aquifers. There were more systems failing to meet the constituent limits for color, iron, and turbidity in those systems where hand pumps are used rather than power pumps. There were also fewer hand-pumped systems failing to meet the TDS standard. The bacteriological quality was essentially the same for these types of systems.

A high standard plate count in this study was considered to be anything over 1,000 organisms/ml. Laboratory results show that 27 (47 percent) of the systems studied had a high standard plate count in the distribution system. Many of these were quite high, exceeding 10,000 organisms/ml.

Table 9 compares the disinfection practices of those systems in which large bacterial populations were found.

TABLE 8.–Comparison of well water systems in Kansas for those systems failing to meet constituent limits

Constituent	Power-pumped wells (10)		Hand-pumped wells (7)	
	Number	Percent	Number	Percent
	Recommended limits			
Color	0	0	2	29
Iron	2	20	5	71
Manganese	2	20	1	14
Nitrate	1	10	1	14
Sulfate	2	20	2	29
Total dissolved solids	10	100	4	57
Turbidity	0	0	4	57
Zinc	1	10	2	29
	Mandatory limits			
Chromium	0	0	1	14
Coliform Organisms	1	10	1	14
Selenium	4	40	1	14

TABLE 9.–Comparison of disinfection practices and bacteriological contamination at water systems surveyed

Number of Systems	No chlorination practiced		Chlorination practiced		Chlorination practiced, no residual found		Chlorination practiced, residual found	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
7 systems with coliform contamination	4	57	3	43	3	100	0	0
28 systems with high standard plate count	13	46	15	54	12	80	3	20

Thirteen (46 percent), of those systems with a high standard plate count did not practice any type of disinfection. Of the 15 (54 percent) that did practice disinfection (chlorination in all cases) 12 (80 percent) did not show a detectable chlorine residual on the day of the field survey. For those systems contaminated with coliform bacteria, four (57 percent) did not disinfect in any way. Of those systems which chlorinated, none had a detectable chlorine residual in the distribution system at the time of the field survey.

Water samples were collected from 10 reservoirs for chlorinated insecticide analysis. Water was withdrawn from each of these reservoirs for drinking water. The 10 reservoirs from which these water samples were taken are:

1. Lake Berryessa
2. Lake Amador
3. Lake Folsom
4. Lake Jenkinson
5. Lake Casitas
6. Lake San Luis
7. Lake Havasu
8. Lake Imperial
9. Lake Cachuma
10. Lake Mead

None of the 12 chlorinated insecticides for which tests were made were found in the water from any of these reservoirs.

Bacteriological Surveillance

Since bacteriological samples collected at the time of the field survey can only give an indication of the quality of water at a given time and not a complete picture of water quality over a period of time, an effort was made to gather the records of bacteriological examinations made in the 12 months before the field survey. Records of tests made by the State and county health departments, and sometimes by private laboratories, were examined, and the bacteriological quality and the number of bacteriological samples

collected each month from the distribution system were recorded.

Although the bacteriological surveillance varied widely from 0 to 32 samples per month, it generally did not meet the Drinking Water Standards. In fact, only four systems (7 percent) were sampled frequently enough to meet the Drinking Water Standards.

The eight systems studied at Lake Berryessa in Napa County, Calif., have the two samples per month minimum required by the Drinking Water Standards, but this frequency generally was maintained only during the summer months (June–September) with infrequent sampling the remainder of the year. The required number of samples were taken at Boulder City, Nev., and at San Luis, Cachuma, and Casitas, Calif. The Kansas State Health Department collects a maximum of one water sample per month for bacteriological tests while the pressure systems are operational in the summer. However, samples were skipped during many months. No surveillance was maintained in Kansas on the hand pumped wells or on those systems built and operated by concessions. All other water systems studied in this survey had only sporadic bacteriological surveillance.

Overall, records could not be found for any bacteriological testing within the preceding 12 months at 23, (40 percent) of the water systems studied. Of the 35 systems for which some records were available, 10 (28 percent) showed coliform contamination during at least 1 month in the past year. Eight systems showed contamination in 2 months or more. These figures become even more significant with the realization that many of these systems take only two or three bacteriological samples per year. These 10 systems represent the minimum number that would fail to meet the Drinking Water Standards. If the water quality was accurately determined (i.e., the required number of bacteriological samples were taken), there might be more systems violating the Drinking Water Standards.

Chemical Surveillance

Chemical surveillance generally is not maintained on any of the drinking water systems that were examined. The Bureau of Reclamation does routinely require chemical analysis of the water in its reservoirs. In this way, an indirect check of chemical constituents in those water systems using reservoir water is maintained. This chemical analysis however, does not include all of the constituents in the Drinking Water Standards.

Operation and Control

Adequate operation and control, as defined in this study, means that the operator maintains daily surveillance of all aspects of his water system. This surveillance includes, in the case of chlorination, daily checks on chlorine residuals in the distribution system. Sand filters should be checked to see that they are operating properly and whether backwashing is necessary. Fifty-five (95 percent) of the water systems studied were under the direct control of local personnel and did not buy wholesale finished water. Of these, only 26 (47 percent) had good operation and control.

Records of the chlorine residuals taken each day should be maintained and the records of past chemical, physical, and bacteriological examinations and sanitary surveys should be retained. Twenty-nine of the systems studied did keep records of past performance. One of the systems that practiced some form of clarification had high turbidity in the finished water. The Diamond Springs Main system at Jenkinson Reservoir had turbidity of 3.6 s.u. (standard units) on the day of the field inspection, indicating a failure of the coagulation-sedimentation treatment process being practiced. All of the other systems that practiced some form of clarification had acceptable turbidity levels in the distribution system.

As previously stated, 34 systems practice chlorination to disinfect the water. Table 10 presents a breakdown of which types of systems chlorinate and how well they maintain a chlorine residual. Twenty-two (79 percent) of those systems which chlorinate use surface water. Six, (17 percent) of the systems which chlorinated did not have a chlorine residual in the distribution system or storage tank at the time of the survey, indicating a major failure in the chlorination process. Twenty-four (67 percent) of the systems did not maintain a chlorine residual at the ends of the distribution lines.

An investigation of source protection was attempted at all the systems studied. All of the surface water sources were adequately protected. No information

TABLE 10.–Chlorination practices and their effectiveness at water systems surveyed

Source	Number of supplies that chlorinate	Systems with chlorine residual found in storage tank		Systems with chlorine residual found in distribution system	
		Number	Percent of those which chlorinate	Number	Percent of those which chlorinate
Surface water	28	22	79	7	28
Ground water	8	8	100	5	63
Total	36	30	83	12	33

could be obtained concerning the well construction for four of the wells studied. Four other wells were considered not to have adequate protection, one in Kansas and three in California. The deficiencies generally were related to the absence of a sanitary well seal (i.e., there was usually an open casing). The remainder of the wells had good protection.

Adequate pressure (greater than 20 psi) in the distribution systems of the water systems was maintained in every case. Generally, elevated tanks and/or pressure tanks were employed to sustain the required pressure.

Raw Water Quality

Table 11 provides a summary of the raw water quality found. Water systems for which raw water data were unavailable or from which a raw water sample for bacteriological analysis could not be taken are not included in this table. The figures show that the bacteriological quality of water obtained from groundwater sources is far better than that of surface water sources in the total coliform and fecal coliform categories. The standard plate count was essentially the same for ground and surface water with surface water having a slight edge in quality.

TABLE 11.—Bacteriological quality of raw water at water systems surveyed

Density	Ground water (12)	Surface water (20)
Total coliform		
< 1/100 ml	83%	25%
1/100 ml - 4/100 ml	0	35
5/100 ml -10/100 ml	0	10
11/100 ml -50/100 ml	0	20
>50/100 ml	17	10
Fecal coliform		
< 1/100 ml	92%	45%
1/100 ml - 4/100 ml	8	45
5/100 ml -10/100 ml	0	0
11/100 ml -50/100 ml	0	5
>50/100 ml	0	5
Standard plate count		
< 1 ml -100 ml	0%	20%
101 ml -500 ml	17	30
501 ml -1,000 ml	8	30
1,001 ml -10,000 ml	25	15
>10,000 ml	50	5

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DISCUSSION

General

The efforts of the Bureau of Reclamation to provide recreational facilities at its reservoirs can only be applauded. The fact that these reservoirs are visited by 55 million people a year is prima facie evidence that the public accepts these recreational opportunities and is willing to make use of them. The public assumes and rightly expects that the drinking water made available to them is safe for consumption and will be esthetically pleasing. The recommendations included in this report are presented with these objectives in mind.

One of the problems is in applying established criteria and standards for municipal systems to the small types of water systems found in this study. These small systems have water demands that vary to a large degree during the week. Also, due to economic considerations, small systems have a difficult time providing the full water treatment that large water systems routinely employ. Criteria and standards should be developed for the construction and operation of small public drinking water systems serving recreational areas.

This project was a pilot study involving a small number of systems in isolated geographic areas. The study illuminated enough health hazards to cast doubt on the ability of these small systems as presently operated to continuously produce water that is both safe and esthetically pleasing. The study should, therefore, be extended to other Federally related small water supplies to fully assess the ability of these systems to produce this type of water.

Water Quality and Source

Since 57 percent of the water systems failed to meet some constituent limit of the Drinking Water Standards, this study shows that there is a general need for improvement in water quality for the supplies studied. This need for improvement is not as critical for those supplies which failed to meet only recommended standards as it is for those which failed to meet the mandatory limits, but improvement is important for all these systems.

At the time of the field survey, four (17 percent) of the well water systems and three (11 percent) of the systems using surface water as a raw water source were contaminated with coliform bacteria. The meaning of these statistics in relation to the facilities and operation of each system and the surveillance of each system will be discussed later. Immediate steps should be taken to determine the source of contamination and to separate this source from the water supply. Disinfection of the water may need to be instituted. Check samples should be taken until the water supply can be guaranteed to be safe.

All systems that used finished water bought wholesale from municipal systems were free from coliform contamination. This is in general agreement with the findings of the community water supply study,[1] which show that water produced by larger systems is generally of higher quality than that produced by smaller systems. In this study of Bureau of Reclamation-related water systems, only one other constituent limit was not met by a system using wholesale finished water.

Twenty-seven (47 percent) of the water systems studied evidenced a high standard plate count. The standard plate count is another parameter that reflects on the quality of the water system. Although a high standard plate count does not usually have a direct health significance, it does relate to the quality control of water treatment processes and sanitation of distribution line sections and storage tanks. The results of recent research also suggest that the inhibitory influence of various organisms may be an important factor that could suppress the detection of the coliform group.

The standard plate count of the raw water examined in this study was higher for the water systems using ground water than for the systems using surface water as a raw water source. The reason for this unexpected variance is not clear at this time.

Two mandatory chemical limits were not met in the study, chromium and selenium. The chromium limit was not met in only one water system, a hand pump at Norton Reservoir in Kansas. The cause of this problem is not known. The system should be resampled to provide more information.

The standard for selenium was surpassed for one-third of the systems in Kansas, indicating the probability of high concentrations of selenium in all the aquifers in the area. Selenium cannot be easily removed by known water treatment methods. There are rather expensive methods available, such as reverse osmosis; but these are not now practical for small water systems. New raw water sources should be developed. The water from other wells in this area is also likely to contain high concentrations of selenium, so the use of the water in the existing reservoir with proper treatment (disinfection and clarification) may be needed, despite the difficulties and costs inherent in developing and maintaining a surface supply for a small system.

[1] McCabe, L. J., Symons, J. M., Lee, R. D., Robeck, G. G., "Survey of Community Water Supply Systems," *Journal American Water Works Association*

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The results of this study show that 31 (53 percent) systems produced water that did not meet at least one recommended limit of the Drinking Water Standards. These recommended limits are primarily esthetic in nature and are divided into chemical and physical characteristics. They relate to materials that impart objectionable taste, appearance, and odor to the water, and are important because a consumer may reject a safe water supply if its taste or appearance is unsatisfactory to him. Therefore, these limits should not be exceeded when a more suitable water source can be made available.

Of the seven water systems that did not meet the 5 s.u. limit for turbidity, six obtained their water from wells and one used a lake for a source. None of these systems provided any form of clarification. A high level of turbidity is not acceptable for esthetic reasons; this condition can also interfere with the disinfection process. The presence of high turbidity can be classified as a possible health hazard. It suggests a poor quality source or construction and either poor operation or inadequate treatment. For these reasons, consideration is now being given to lowering the turbidity limit in the revised Drinking Water Standards from 5 to 1 s.u. Nineteen (33 percent) of the systems studied had a turbidity in excess of 1 s.u.

The other recommended limits exceeded with greatest frequency were total dissolved solids (TDS), sulfate, and iron. "Recommended limit" means that water supplies containing high levels of these materials should not be used if other more suitable supplies can be made available. These limits were not met principally in Kansas where all the systems studied were wells. The level of sulfates and TDS were also quite high in those systems along the Colorado River. The water for these systems is taken either directly from the river or from a well very close to the river.

Facilities and Operation

The cisterns used for drinking water systems have presented many problems in the past, as found in the Corps of Engineers study. One of the three cisterns found in this study was grossly contaminated. When water is transported by truck, there are many avenues available for contamination of the supply. If at all possible, another water system should be developed. If the use of cisterns is continued, the water should be adequately chlorinated when placed in the cistern. Also, daily chlorine residual determinations of water in the cistern should be made to assure that the water retains its chlorine residual.

One of the major problems noted in this study was with disinfection. For those systems contaminated with coliform bacteria, four (57 percent) did not disinfect in any way. All disinfection that was practiced was chlorination. Of those systems which chlorinated, 12 (80 percent) had no detectable chlorine residual in the distribution system on the day of the survey. None of those systems with coliform contamination carried a detectable chlorine residual on the day of the study. These results are similar to those found in the study of drinking water supplies around Corps of Engineers reservoirs.

Chlorination of a water system involves several operating problems. Quite often the chlorine feed system becomes clogged or the chlorinator is inadvertently turned off. Some consumers also complain about the taste and odor of chlorinated water. The fact that a chlorinator has been placed in the water system does not guarantee a safe supply. If chlorinators are used for disinfection, daily inspections of the feed equipment and determinations of the chlorine residuals must be conducted.

Another problem faced by many small systems is that during periods of low water use, the chlorine residual disappears in the distribution system and sometimes in the storage tank. In order to help rectify some of these problems, alternative means of disinfection should be reviewed.

A problem with operation and control, except for chlorination practices, was with clarification. As was discussed in the preceding section, a turbidity unit of 1 s.u. has been proposed for inclusion in the 1973 Drinking Water Standards. In addition, any properly operated clarification process should easily produce water within this 1 s.u. limit. The finished water from one water system practicing clarification exceeded this limit. The turbidity level of the distributed water should be checked daily on water systems that practice clarification.

All of the foregoing operational problems emphasize the necessity for some type of operator training. Most of the individuals responsible for the water systems do not have a full knowledge of what they should be doing and the reasoning behind these duties. A short course or booklet should be developed that would explain why the required maintenance and surveillance practices are important.

The Bureau of Reclamation should maintain closer control of the water systems around their reservoirs. An identifiable organizational unit or specific positions in an existing office should be established at the regional office level, headquarters level, and the Bureau of Reclamation's Engineering and Research Center in Denver, Colo., with well defined responsibilities for water systems adjacent to the reservoirs. This group of positions would control the centralized approval of construction plans for new systems, including water systems to be built by others, and should provide for the monitoring and operational review of all systems on Reclamation projects. Where water quality problems are indicated, the Bureau of Reclamation should seek a better source of water and/or provide additional

treatment. The Bureau should make sure that those people responsible for the operation and maintenance of the water systems have the appropriate training to execute their responsiblities. The State and local health departments are also essential in this process of disseminating information and their activities in this area need to be expanded.

Surveillance

The Environmental Protection Agency requires that all water systems approved for use on interstate carriers meet the criteria specified in the Drinking Water Standards. This provision is for the protection of the traveling public. If these standards were applied to the water systems in this study, only 7 percent would be approved for use with respect to bacteriological sampling frequency. There is a great need for the initiation of a bacteriological sampling program at these systems.

Napa County, Calif., has a good sampling program during the warm summer months and the larger supplies in Kansas have a periodic sampling system (usually once a month) during the warm months. These should be expanded to include the entire time that the systems are operational. Surveillance is important for even the smallest hand pump because the consumer will assume that the water is safe if it is available. Any system can become contaminated at any time.

Chemical surveillance is generally not practiced, the only exception being the periodic testing of the reservoir water by the Bureau of Reclamation. Well water should be tested at least once for all chemical constituents listed in the Drinking Water Standards before the water is made available to the public. More frequent chemical analysis is recommended for all systems served by a surface water source, and periodic chemical analysis is recommended for systems supplied by wells when there is reason to believe the chemical quality may be deteriorating.

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Appendices

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APPENDIX A

ENVIRONMENTAL PROTECTION AGENCY
DRINKING WATER STANDARDS
1973 Revision

The 1962 Public Health Service Drinking Water Standards are currently under revision by the Environmental Protection Agency (EPA). The responsibility for establishment of standards for potable water was transferred to the EPA under the authority of the Presidential Reorganization Plan No. 3 in 1970. Recommended revisions to the 1962 Standards were completed in December 1971 by a technical committee of Federal experts under the sponsorship of the EPA. Their recommendations are currently under review by an advisory committee composed of representatives of public and private organizations concerned with the problems of public health protection for drinking water supplies.

The Technical Committee recommended the following changes to the 1962 Standards:

BACTERIOLOGICAL SAMPLE SIZE

Coliform - Standard sample for membrane filter technique raised from 50 ml to 100 ml.

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DEFINITIONS

To change the designated maximum allowable limits from "Recommended Concentration" to "Approval Limit (Esthetics)" and "Mandatory Concentration" to "Approval Limit (Health)".

CHEMICAL AND PHYSICAL APPROVAL LIMITS

Item	1962		1973	
	Mandatory	Recommended	Health	Esthetic
Turbidity, T.U.		5	1[1]	
Threshold odor number		3		2[2]
Arsenic, mg/l	0.05	0.01	0.1	
Organics-Carbon Adsorbable, mg/l				
carbon chloroform extractable		0.2	0.7[3]	
carbon alcholhol extractable			3	
Phenols, mg/l		0.001		
T.D.S., mg/l		500		
Mercury, mg/l			0.005[4]	
Sodium, mg/l			270[5]	

1/ The Advisory Committee recommended restricting the 1 turbidity unit limit to the point where the water enters the distribution system.

2/ The Advisory Committee recommended the threshold odor number remain 3.

3/ Determination by using an improved miniaturized sampler and extraction technique.

4/ The Advisory Committee recommended lowering the maximum allowable limit to .002 mg/l.

5/ The Technical Committee recommended 270 mg/l as a "health" limit--with special provision for notifications at the 20 mg/l level. The Advisory Committee recommended the elimination of sodium as a designated limit but the inclusion of the words and warnings prepared by the Technical Committee.

PESTICIDE - HERBICIDE APPROVAL LIMITS (HEALTH)-1973

(These compounds were not included in the 1962 Standards)

Item	Concentration
Chlorinated Hydrocarbon Pesticides	mg/l
Aldrin	0.001
Chlordane	0.003
DDT	0.05
Dieldrin	0.001
Endrin	0.0005
Heptachlor	0.0001
Heptachlor epoxide	0.0001
Lindane	0.005
Methoxychlor	1.0
Toxaphene	0.005
Organophosphate and Carbamate Pesticides, total	0.1 (parathion equivalent)
Chlorophenoxy Herbicides:	
2,4-D	0.02
2,4,5-T[6/]	0.002
2,4,5-TP (Silvex)	0.03

RADIOLOGICAL APPROVAL LIMITS (HEALTH)

Activity (pCi/l)	1962	1973
Alpha		
Gross		0.5 (5 when Ra 226 is less than 0.5)
Radium 226	3	0.5
Beta		
Gross	1000 in absence of Strontium 90	5 (50 plus Potassium 40 when Sr 90 is less than 5)
Strontium 90	10	5

6/ The Advisory Committee has recommended the deletion of 2,4,5-T from the Standards because of recent restrictions imposed on its use in this country.

Further research is needed to expand present information before standards can be developed for (1) emergency situations, (2) the direct use of wastewaters as drinking water sources, and (3) hazardous materials such as nickel, tin, vanadium, lithium, boron, beryllium, antimony, molybdenum, uranyl ion, viruses, hormones, adhesives, coatings, solvents, asbestos, and carcinogenic and/or teratogenic organic compounds. The Technical Committee also recognized the need for standards for new synthetic organic compounds that may be introduced into the environment in substantial amounts, such as nitrilotriacetic acid (NTA) and polychlorinated biphenyls (PCB), and considered the inclusion of a value for tritium. Standards for these three materials were discussed by the Technical Committee, but were deferred until more definitive toxicological information becomes available.

APPENDIX B

INDIVIDUAL SANITARY SURVEY RESULTS

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The individual sanitary survey results on the succeeding pages were produced for each supply studied and copies were sent to the individuals involved with each supply. In the few cases where not all of the chemical results are listed, the data was not available from the laboratory.

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE: KANSAS
NAME OF AREA: Cedar Bluff
NAME OF SUPPLY: North Side Pressure System
DATE OF SURVEY: 10-7-71
TREATMENT: Chlorination

SOURCE: Well
PUMP: Submersible
STORAGE: Ground level tank

BACTERIOLOGICAL SURVEILLANCE: None in the past year.

BACTERIOLOGICAL QUALITY: High Standard Plate Count

CHEMICAL QUALITY

PHS MANDATORY LIMITS EXCEEDED: None

PHS RECOMMENDED LIMITS EXCEEDED: Total Dissolved Solids, Manganese

OPERATION, CONTROL & SANITARY DEFECTS

1. The chlorine residual should be checked daily.
2. On the day of the survey, a chlorine residual was found in the storage tank but not in the distribution system.

COMMENTS

Bacteriological samples should be taken as prescribed in the PHS.

A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)+ (0.05)++	< 0.005	COPPER (1.0)+	0.031	NITRATE (45)+	0.9
BARIUM (1.0)++	< .05	CYANIDE (0.01)+ (0.2)++	0.0	pH	7.6
BORON (1.0)+ (5.0)++	0.103	FLUORIDE (1.4 to 2.4)++		SELENIUM (0.01)++	0.003
CADMIUM (0.01)++	0.00	IRON (0.3)+	0.023	SILVER (0.05)++	0.00
CHLORIDE (250)+	21.0	LEAD (0.05)++	0.00	SULFATE (250)+	350.0
CHROMIUM (.05)++	0.00	R.B.A.S. (0.5)+	0.036	TOTAL DISSOLVED SOLIDS (500)+	799.0
COBALT	0.00	MANGANESE (0.05)+	1.3	TURBIDITY (5 s.u.)+	0.42
COLOR (15 s.u.)+	< 5	MERCURY	< .0005	ZINC (5.0)+	1.9
		NICKEL	0.012		

** MANDATORY LIMIT *** RECOMMENDED LIMIT

ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER	< 1	< 1	48
DISTRIBUTION #1	< 1	< 1	34,000
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE: KANSAS
NAME OF AREA: Cedar Bluff
NAME OF SUPPLY: Headquarters System
DATE OF SURVEY: 10-7-71
TREATMENT: None

SOURCE: Well
PUMP: Submersible
STORAGE: Pressure Tank

BACTERIOLOGICAL SURVEILLANCE: Two samples taken in the past year

BACTERIOLOGICAL QUALITY: Good

CHEMICAL QUALITY

PHS MANDATORY LIMITS EXCEEDED: None

PHS RECOMMENDED LIMITS EXCEEDED: Total Dissolved Solids, Sulfate

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

Bacteriological sampling should be increased to meet the PHS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)+ (0.05)++	< 0.005	COPPER (1.0)+	0.11	NITRATE (45)+	0.3
BARIUM (1.0)++	< .05	CYANIDE (0.01)+ (0.2)++	0.0	pH	7.6
BORON (1.0)+ (5.0)++	< 0.1	FLUORIDE (1.4 to 2.4)++		SELENIUM (0.01)++	0.002
CADMIUM (0.01)++	0.00	IRON (0.3)+	0.060	SILVER (0.05)++	0.00
CHLORIDE (250)+	< 5.0	LEAD (0.05)++	0.00	SULFATE (250)+	285.0
CHROMIUM (.05)++	0.00	R.B.A.S. (0.5)+	0.020	TOTAL DISSOLVED SOLIDS (500)+	707.2
COBALT	0.00	MANGANESE (0.05)+	0.00	TURBIDITY (5 s.u.)+	0.9
COLOR (15 s.u.)+	< 5	MERCURY	< .0005	ZINC (5.0)+	0.018
		NICKEL	0.00		

** MANDATORY LIMIT *** RECOMMENDED LIMIT

ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	1,000
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE	KANSAS	SOURCE	Well
NAME OF AREA	Cedar Bluff	PUMP	Submersible
NAME OF SUPPLY	South Side Pressure System	STORAGE	Ground level storage tank
DATE OF SURVEY	10-7-71		
TREATMENT	Chlorination		

BACTERIOLOGICAL SURVEILLANCE: Less than one sample per month is examined.

BACTERIOLOGICAL QUALITY: Good

CHEMICAL QUALITY

PHS MANDATORY LIMITS EXCEEDED: None

PHS RECOMMENDED LIMITS EXCEEDED: Nitrate

OPERATION, CONTROL & SANITARY DEFECTS

1. The chlorine residual should be checked daily.
2. A chlorine residual was found on the day of the survey.

COMMENTS

Bacteriological sampling should be increased as recommended by the PHS.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.071	NITRATE (45)*	46.3
BARIUM (1.0)**	.13	CYANIDE (0.01)* (0.2)**	0.0	pH	7.6
BORON (1.0)* (5.0)**	0.130	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.006
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.021	SILVER (0.05)**	0.00
CHLORIDE (250)*	6.8	LEAD (0.05)**	0.013	SULFATE (250)*	73.5
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.020	TOTAL DISSOLVED SOLIDS (500)*	469.5
COBALT	0.00	MANGANESE (0.05)*	0.00	TURBIDITY (5 s.u.)*	0.27
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	0.73
* RECOMMENDED LIMIT ** MANDATORY LIMIT		NICKEL	0.00	ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE STATED.	

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	1
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE	KANSAS	SOURCE	Well
NAME OF AREA	Glen Elder	PUMP	Unknown
NAME OF SUPPLY	Visitors Center	STORAGE	Elevated Tank
DATE OF SURVEY	10-5-71		
TREATMENT	Chlorination		

BACTERIOLOGICAL SURVEILLANCE: Unknown

BACTERIOLOGICAL QUALITY: High standard plate count.

CHEMICAL QUALITY

PHS MANDATORY LIMITS EXCEEDED: Selenium

PHS RECOMMENDED LIMITS EXCEEDED: Total Dissolved Solids

OPERATION, CONTROL & SANITARY DEFECTS: No chlorine residual was found

COMMENTS

Water comes from the Glen Elder Municipal Supply. These treatment facilities were not inspected.

A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	.54	NITRATE (45)*	32.8
BARIUM (1.0)**	.16	CYANIDE (0.01)* (0.2)**	0.000	pH	7.3
BORON (1.0)* (5.0)**	0.191	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.020
CADMIUM (0.01)**	.000	IRON (0.3)*	.11	SILVER (0.05)**	.000
CHLORIDE (250)*	11.9	LEAD (0.05)**	.000	SULFATE (250)*	101.0
CHROMIUM (.05)**	.000	M.B.A.S. (0.5)*	0.020	TOTAL DISSOLVED SOLIDS (500)*	338.0
COBALT	.000	MANGANESE (0.05)*	.000	TURBIDITY (5 s.u.)*	.33
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	.17
* RECOMMENDED LIMIT ** MANDATORY LIMIT		NICKEL	.000	ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE STATED.	

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	1700
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE: KANSAS
NAME OF AREA: Kirwin
NAME OF SUPPLY: Boy Scout
DATE OF SURVEY: 10-6-71
TREATMENT: None

SOURCE: Well
PUMP: Submersible
STORAGE: Ground level storage tank

BACTERIOLOGICAL SURVEILLANCE: None

BACTERIOLOGICAL QUALITY: High Standard Plate Count

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED: Selenium

PHS RECOMMENDED LIMITS EXCEEDED: Total Dissolved Solids

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

Bacteriological sampling should be practiced according to the PHS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.097	NITRATE (45)*	9.3
BARIUM (1.0)**	.15	CYANIDE (0.01)* (0.2)**	0.0	pH	7.5
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.025
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.039	SILVER (0.05)**	0.00
CHLORIDE (250)*	< 5.0	LEAD (0.05)**	0.00	SULFATE (250)*	131.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.020	TOTAL DISSOLVED SOLIDS (500)*	556.3
COBALT	0.00	MANGANESE (0.05)*	0.00	TURBIDITY (5 s.u.)*	0.4
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	0.051
*RECOMMENDED LIMIT **MANDATORY LIMIT		NICKEL	0.00	ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.	

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	8,500
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE: KANSAS
NAME OF AREA: Kirwin
NAME OF SUPPLY: Concession
DATE OF SURVEY: 10-6-71
TREATMENT: None

SOURCE: Well
PUMP: Submersible
STORAGE: Pressure tank

BACTERIOLOGICAL SURVEILLANCE: None

BACTERIOLOGICAL QUALITY: High Standard Plate Count

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED: Selenium

PHS RECOMMENDED LIMITS EXCEEDED: Total Dissolved Solids, Sulfate

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

Bacteriological sampling should be practiced according to the PHS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	0.009	NITRATE (45)*	16.9
BARIUM (1.0)**	.13	CYANIDE (0.01)* (0.2)**	0.0	pH	7.5
BORON (1.0)* (5.0)**	0.095	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.041
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.014	SILVER (0.05)**	0.00
CHLORIDE (250)*	122.0	LEAD (0.05)**	0.00	SULFATE (250)*	525.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.038	TOTAL DISSOLVED SOLIDS (500)*	1775.5
COBALT	0.00	MANGANESE (0.05)*	0.00	TURBIDITY (5 s.u.)*	0.5
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	0.079
*RECOMMENDED LIMIT **MANDATORY LIMIT		NICKEL	0.003	ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.	

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	22,000
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE	KANSAS	SOURCE	Well
NAME OF AREA	Kirwin	PUMP	Submersible
NAME OF SUPPLY	Headquarters	STORAGE	Pressure Tank
DATE OF SURVEY	10-6-71		
TREATMENT	None		

BACTERIOLOGICAL SURVEILLANCE: Tests made only once every six months

BACTERIOLOGICAL QUALITY: High Standard Plate Count

CHEMICAL QUALITY

PHS MANDATORY LIMITS EXCEEDED: Selenium

PHS RECOMMENDED LIMITS EXCEEDED: Manganese, Total Dissolved Solids

OPERATION, CONTROL & SANITARY DEFECTS

There is a possible cross connection at the well in the form of a hose from an overhead pipe which is used for filling trucks.

COMMENTS

Bacteriological sampling should be increased according to the PHS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.014	COPPER (1.0)*	0.013	NITRATE (45)*	20.4
BARIUM (1.0)**	.09	CYANIDE (0.01)* (0.2)**	0.0	pH	7.4
BORON (1.0)* (5.0)**	0.142	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.054
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.022	SILVER (0.05)**	0.00
CHLORIDE (250)*	10.0	LEAD (0.05)**	0.013	SULFATE (250)*	187.5
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.030	TOTAL DISSOLVED SOLIDS (500)*	625.5
COBALT	0.00	MANGANESE (0.05)*	0.059	TURBIDITY (5 s.u.)*	0.27
COLOR (15 s.u.)*	7	MERCURY	< .0005	ZINC (5.0)*	0.601
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT

ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	1,900
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE	KANSAS	SOURCE	Well
NAME OF AREA	Lovewell	PUMP	Centrifugal
NAME OF SUPPLY	Concession	STORAGE	Pressure Tank
DATE OF SURVEY	10-5-71		
TREATMENT	None		

BACTERIOLOGICAL SURVEILLANCE: None

BACTERIOLOGICAL QUALITY: Tests showed the water contained 130 coliform/100 ml

CHEMICAL QUALITY

PHS MANDATORY LIMITS EXCEEDED: None

PHS RECOMMENDED LIMITS EXCEEDED: Total Dissolved Solids, Nitrate

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

1. The system consisted of a well, pressure tank, and distribution system.
2. The bacteriological analysis indicated strong contamination. The source of contamination should be found and some type of disinfection system installed.
3. The bacteriological sampling frequency should most be increased to meet the PHS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	0.017	NITRATE (45)*	82.0
BARIUM (1.0)**	.27	CYANIDE (0.01)* (0.2)**	0.000	pH	7.4
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.005
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.069	SILVER (0.05)**	0.00
CHLORIDE (250)*	6.5	LEAD (0.05)**	0.00	SULFATE (250)*	68.5
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.040	TOTAL DISSOLVED SOLIDS (500)*	287.0
COBALT	0.00	MANGANESE (0.05)*	0.00	TURBIDITY (5 s.u.)*	0.33
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	0.320
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT

ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	130	< 1	190
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE	KANSAS	SOURCE	Well
NAME OF AREA	Lovewell	PUMP	Submersible
NAME OF SUPPLY	Park Pressure System	STORAGE	Pressure Tank
DATE OF SURVEY	10-5-71		
TREATMENT	Chlorination		

BACTERIOLOGICAL SURVEILLANCE: One sample per month

BACTERIOLOGICAL QUALITY: Good

CHEMICAL QUALITY

PHS MANDATORY LIMITS EXCEEDED: None

PHS RECOMMENDED LIMITS EXCEEDED: Total Dissolved Solids

OPERATION, CONTROL & SANITARY DEFECTS

A chlorine residual was found at all points in the distribution system during the survey.

COMMENTS
1. The chlorine residual should be checked daily.
2. The bacteriological sampling frequency should be increased to meet the PHS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	0.020	NITRATE (45)*	31.0
BARIUM (1.0)**	.54	CYANIDE (0.01)* (0.2)**	0.0	pH	7.5
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.006
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.043	SILVER (0.05)**	0.00
CHLORIDE (250)*	13.3	LEAD (0.05)**	0.00	SULFATE (250)*	21.4
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.030	TOTAL DISSOLVED SOLIDS (500)*	538.5
COBALT	0.00	MANGANESE (0.05)*	0.012	TURBIDITY (5 s.u.)*	1.0
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	2.4
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT — ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	6
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE	KANSAS	SOURCE	Well
NAME OF AREA	Lovewell	PUMP	Handpump
NAME OF SUPPLY	Scout Area	STORAGE	None
DATE OF SURVEY	10-5-71		
TREATMENT	None		

BACTERIOLOGICAL SURVEILLANCE: No record of any tests in past year

BACTERIOLOGICAL QUALITY: Good at time of visit

CHEMICAL QUALITY

PHS MANDATORY LIMITS EXCEEDED: None

PHS RECOMMENDED LIMITS EXCEEDED: Total Dissolved Solids, Color, Sulfate, Manganese, Iron, Turbidity

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS
1. The Scout Area is served by an old handpump which was apparently in place before the reservoir was completed.
2. No records were available concerning well construction or quality testing.
3. Bacteriological surveillance should be practiced according to the PHS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	.013	NITRATE (45)*	0.8
BARIUM (1.0)**	26	CYANIDE (0.01)* (0.2)**	0.000	pH	7.1
BORON (1.0)* (5.0)**	0.135	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.002
CADMIUM (0.01)**	.003	IRON (0.3)*	5.53	SILVER (0.05)**	.000
CHLORIDE (250)*	13.0	LEAD (0.05)**	.000	SULFATE (250)*	270.0
CHROMIUM (.05)**	.000	M.B.A.S. (0.5)*	0.026	TOTAL DISSOLVED SOLIDS (500)*	895.5
COBALT	.004	MANGANESE (0.05)*	.26	TURBIDITY (5 s.u.)*	52.0
COLOR (15 s.u.)*	> 100	MERCURY	< .0005	ZINC (5.0)*	.48
		NICKEL	.007		

*RECOMMENDED LIMIT **MANDATORY LIMIT — ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	640
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE KANSAS
NAME OF AREA Horton
NAME OF SUPPLY Handpump #1 (Numbering E to W)
DATE OF SURVEY 10-6-71
TREATMENT None

SOURCE Well
PUMP Handpump
STORAGE None

BACTERIOLOGICAL SURVEILLANCE None

BACTERIOLOGICAL QUALITY High Standard Plate Count

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED None

DWS RECOMMENDED LIMITS EXCEEDED Zinc

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

The bacteriological sampling frequency should be practiced according to the DWS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	.000	NITRATE (45)*	0.1
BARIUM (1.0)**	.17	CYANIDE (0.01)* (0.2)**	0.000	pH	7.6
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.002
CADMIUM (0.01)**	.001	IRON (0.3)*	.17	SILVER (0.05)**	.000
CHLORIDE (250)*	6.0	LEAD (0.05)**	.004	SULFATE (250)*	10.2
CHROMIUM (.05)**	.000	M.B.A.S. (0.5)*	0.040	TOTAL DISSOLVED SOLIDS (500)*	297.5
COBALT	.000	MANGANESE (0.05)*	.021	TURBIDITY (5 s.u.)*	2.8
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	6.6
*RECOMMENDED LIMIT **MANDATORY LIMIT		NICKEL	.003	ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.	

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	13,000
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE KANSAS
NAME OF AREA Horton
NAME OF SUPPLY Handpump #2 (Numbering E to W)
DATE OF SURVEY 10-6-71
TREATMENT None

SOURCE Well
PUMP Handpump
STORAGE None

BACTERIOLOGICAL SURVEILLANCE None

BACTERIOLOGICAL QUALITY High Standard Plate Count

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED Chromium, Selenium

DWS RECOMMENDED LIMITS EXCEEDED Iron, Total Dissolved Solids

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

Bacteriological sampling should be practiced in accordance with the DWS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	0.047	NITRATE (45)*	41.6
BARIUM (1.0)**	.13	CYANIDE (0.01)* (0.2)**	0.0	pH	7.5
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.019
CADMIUM (0.01)**	0.002	IRON (0.3)*	0.52	SILVER (0.05)**	0.00
CHLORIDE (250)*	13.3	LEAD (0.05)**	0.00	SULFATE (250)*	177.5
CHROMIUM (.05)**	0.067	M.B.A.S. (0.5)*	0.055	TOTAL DISSOLVED SOLIDS (500)*	742.5
COBALT	0.009	MANGANESE (0.05)*	0.005	TURBIDITY (5 s.u.)*	1.2
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	1.0
*RECOMMENDED LIMIT **MANDATORY LIMIT		NICKEL	0.025	ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.	

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	22,000
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE Kansas
NAME OF AREA Norton
NAME OF SUPPLY Handpump #3 (Numbering E to W)
DATE OF SURVEY 10-6-71
TREATMENT None

SOURCE Well
PUMP Handpump
STORAGE None

BACTERIOLOGICAL SURVEILLANCE None

BACTERIOLOGICAL QUALITY High Standard Plate Count

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED None

DWS RECOMMENDED LIMITS EXCEEDED Turbidity

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

Bacteriological sampling should be practiced in accordance with the DWS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	0.012	NITRATE (45)*	37.2
BARIUM (1.0)**	.27	CYANIDE (0.01)* (0.2)**	0.0	pH	7.6
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.003
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.14	SILVER (0.05)**	0.00
CHLORIDE (250)*	7.3	LEAD (0.05)**	0.00	SULFATE (250)*	20.2
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.076	TOTAL DISSOLVED SOLIDS (500)*	357.5
COBALT	0.00	MANGANESE (0.05)*	0.011	TURBIDITY (5 s.u.)*	5.3
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	4.5
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT
ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	21,000
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE Kansas
NAME OF AREA Norton
NAME OF SUPPLY Handpump #4 (Numbering E to W)
DATE OF SURVEY 10-6-71
TREATMENT None

SOURCE Well
PUMP Handpump
STORAGE None

BACTERIOLOGICAL SURVEILLANCE None

BACTERIOLOGICAL QUALITY High Standard Plate Count

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED None

DWS RECOMMENDED LIMITS EXCEEDED Turbidity, Color, Zinc, Iron

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

Bacteriological sampling should be practiced according to the DWS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.076	NITRATE (45)*	10.2
BARIUM (1.0)**	.19	CYANIDE (0.01)* (0.2)**	0.0	pH	7.6
BORON (1.0)* (5.0)**	0.001	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	< 0.001
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.77	SILVER (0.05)**	0.007
CHLORIDE (250)*	< 5.0	LEAD (0.05)**	0.021	SULFATE (250)*	17.5
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.026	TOTAL DISSOLVED SOLIDS (500)*	331.5
COBALT	0.00	MANGANESE (0.05)*	0.018	TURBIDITY (5 s.u.)*	195.0
COLOR (15 s.u.)*	> 100	MERCURY	< .0005	ZINC (5.0)*	7.7
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT
ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	28,000
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE	KANSAS	SOURCE	Well
NAME OF AREA	Norton	PUMP	Handpump
NAME OF SUPPLY	Handpump #5 (Numbering E to W)	STORAGE	None
DATE OF SURVEY	10-6-71		
TREATMENT	None		

BACTERIOLOGICAL SURVEILLANCE None

BACTERIOLOGICAL QUALITY High Standard Plate Count

CHEMICAL QUALITY

DWS MANDATORY LIMITS EXCEEDED None

DWS RECOMMENDED LIMITS EXCEEDED Total Dissolved Solids, Nitrate, Iron

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

Bacteriological sampling should be practiced according to the DWS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.016	NITRATE (45)*	56.5
BARIUM (1.0)**	.11	CYANIDE (0.01)* (0.2)**	0.0	pH	7.5
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.007
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.78	SILVER (0.05)**	0.00
CHLORIDE (250)*	6.8	LEAD (0.05)**	0.00	SULFATE (250)*	85.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.026	TOTAL DISSOLVED SOLIDS (500)*	547.1
COBALT	0.00	MANGANESE (0.05)*	0.030	TURBIDITY (5 s.u.)*	4.2
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	0.76
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	7,300
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE	KANSAS	SOURCE	Well
NAME OF AREA	Norton	PUMP	Submersible
NAME OF SUPPLY	Pressure System	STORAGE	Ground level storage tank
DATE OF SURVEY	10-6-71		
TREATMENT	Chlorination		

BACTERIOLOGICAL SURVEILLANCE One sample analyzed per month

BACTERIOLOGICAL QUALITY High Standard Plate Count

CHEMICAL QUALITY

DWS MANDATORY LIMITS EXCEEDED None

DWS RECOMMENDED LIMITS EXCEEDED Total Dissolved Solids

OPERATION, CONTROL & SANITARY DEFECTS

1. Chlorine residual is checked weekly instead of daily.
2. A trace of chlorine was found in the distribution system.

COMMENTS

1. The bacteriological sampling frequency should meet the DWS.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	.097	NITRATE (45)*	26.6
BARIUM (1.0)**	.17	CYANIDE (0.01)* (0.2)**	0.000	pH	7.4
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.007
CADMIUM (0.01)**	.000	IRON (0.3)*	.017	SILVER (0.05)**	.000
CHLORIDE (250)*	10.0	LEAD (0.05)**	.000	SULFATE (250)*	112.5
CHROMIUM (.05)**	.000	M.B.A.S. (0.5)*	0.030	TOTAL DISSOLVED SOLIDS (500)*	202.7
COBALT	.000	MANGANESE (0.05)*	.000	TURBIDITY (5 s.u.)*	0.53
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	1.86
		NICKEL	.000		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER	< 1	< 1	3,900
DISTRIBUTION #1	< 1	< 1	45,000
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE Kansas
NAME OF AREA Webster
NAME OF SUPPLY North Side Pressure System
DATE OF SURVEY 10-7-71
TREATMENT Manual Chlorination

SOURCE Well
PUMP Centrifugal
STORAGE Ground level storage tank

BACTERIOLOGICAL SURVEILLANCE One sample per month is analyzed.

BACTERIOLOGICAL QUALITY Raw water is contaminated. Water in the distribution system has been contaminated in the past. Water quality in the distribution system was good at the time of the survey.

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED Selenium

PHS RECOMMENDED LIMITS EXCEEDED Total Dissolved Solids, Iron, Zinc

OPERATION, CONTROL & SANITARY DEFECTS
1. Chlorine residual should be checked daily.
2. At the time of the survey, the distribution system did not show a chlorine residual. However, the storage tank had a strong chlorine residual.
3. While the well is being pumped, half of the distribution system receives raw water. This should be corrected, and the needed work is planned. 4. The disinfection equipment on hand should be installed. This work is planned.

COMMENTS
1. The bacteriological surveillance should be increased to meet the PHS.
2. If the source of contamination of the well is not found, other sources of raw water should be explored.
3. A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.28	NITRATE (45)*	24.4
BARIUM (1.0)**	.11	CYANIDE (0.01)* (0.2)**	0.0	pH	7.4
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.015
CADMIUM (0.01)**	0.002	IRON (0.3)*	0.69	SILVER (0.05)**	0.00
CHLORIDE (250)*	6.0	LEAD (0.05)**	0.00	SULFATE (250)*	175.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.075	TOTAL DISSOLVED SOLIDS (500)*	748.0
COBALT	0.00	MANGANESE (0.05)*	0.00	TURBIDITY (5 s.u.)*	1.7
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	5.2
		NICKEL	0.00		

* RECOMMENDED LIMIT ** MANDATORY LIMIT
ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	520	< 1	25,000
DISTRIBUTION #1	< 1	< 1	290
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE Kansas
NAME OF AREA Webster
NAME OF SUPPLY South Side Handpump
DATE OF SURVEY 10-7-71
TREATMENT None

SOURCE Well
PUMP Handpump
STORAGE None

BACTERIOLOGICAL SURVEILLANCE None

BACTERIOLOGICAL QUALITY Coliform, fecal coliform, and a high standard plate count were found.

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED Turbidity, Total Dissolved Solids, Sulfate, Iron

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS
1. The pump is old and was installed before the reservoir was constructed.
2. Bacteriological tests should be made at a frequency prescribed by the PHS.
3. The source of contamination of the well should be found and the problem resolved. An alternative would be to remove the pump or post a sign warning potential users of the water about its quality.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.031	NITRATE (45)*	3.0
BARIUM (1.0)**	.09	CYANIDE (0.01)* (0.2)**	0.0	pH	7.2
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.005
CADMIUM (0.01)**	0.005	IRON (0.3)*	3.7	SILVER (0.05)**	0.007
CHLORIDE (250)*	17.5	LEAD (0.05)**	0.00	SULFATE (250)*	395.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.020	TOTAL DISSOLVED SOLIDS (500)*	879.0
COBALT	0.00	MANGANESE (0.05)*	0.053	TURBIDITY (5 s.u.)*	3.1
COLOR (15 s.u.)*	< 5	MERCURY	< .0005	ZINC (5.0)*	2.1
		NICKEL	0.00		

* RECOMMENDED LIMIT ** MANDATORY LIMIT
ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	260	1	1,500
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Berryessa
NAME OF SUPPLY - Lake Berryessa Marina
DATE OF SURVEY - 11/9/71
TREATMENT Sand filtration and chlorination

SOURCE - Lake
PUMP Centrifugal
STORAGE - Ground level storage tanks

BACTERIOLOGICAL SURVEILLANCE - Feb.-1, June-3, July-3, Aug.-4, Sept.-2 samples taken.

BACTERIOLOGICAL QUALITY Good

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED None

OPERATION, CONTROL & SANITARY DEFECTS Chlorine residual found at all points

COMMENTS The frequency of bacteriological sampling should be increased to meet the PHS during the entire time the system is operational.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	<0.005	COPPER (1.0)*	0.007	NITRATE (45)*	0.1
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000	pH	7.9
BORON (1.0)* (5.0)**	0.402	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.001
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.052	SILVER (0.05)**	0.00
CHLORIDE (250)*	35.5	LEAD (0.05)**	0.00	SULFATE (250)*	17.4
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.017	TOTAL DISSOLVED SOLIDS (500)*	176.0
COBALT	0.00	MANGANESE (0.05)*	0.004	TURBIDITY (5 s.u.)*	0.0
COLOR (15 c.u.)*	< 5	MERCURY	< 0.0005	ZINC (5.0)*	0.005
		NICKEL	0.000		

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	20	2	87
DISTRIBUTION #1	<1	<1	10
DISTRIBUTION #2	<1	<1	25

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Berryessa
NAME OF SUPPLY - Markley Cove
DATE OF SURVEY - 11/9/71
TREATMENT - Sand filtration, chlorination

SOURCE - Lake
PUMP - Submersible
STORAGE - Ground level storage tank

BACTERIOLOGICAL SURVEILLANCE 2 samples/month, June-Sept.

BACTERIOLOGICAL QUALITY - One sample each in August and Sept. showed coliform contamination

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED - None

PHS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS
1. No chlorine residual found in distribution system.
2. Chlorine residuals not checked daily.
3. The top of the storage tank was not covered at the time of the field inspection.

COMMENTS 1. The frequency of bacteriological sampling should be increased to meet the PHS during the entire time the system is operational.
2. A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	<0.005	COPPER (1.0)*	0.054	NITRATE (45)*	0.3
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.0	pH	7.6
BORON (1.0)* (5.0)**	0.484	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.002
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.022	SILVER (0.05)**	0.00
CHLORIDE (250)*	<5.0	LEAD (0.05)**	0.00	SULFATE (250)*	17.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.033	TOTAL DISSOLVED SOLIDS (500)*	185.0
COBALT	0.00	MANGANESE (0.05)*	0.004	TURBIDITY (5 s.u.)*	1.0
COLOR (15 c.u.)*	< 5	MERCURY	0.0014	ZINC (5.0)*	0.023
		NICKEL	0.000		

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	< 1	< 1	1400
DISTRIBUTION #1	< 1	< 1	430
DISTRIBUTION #2	< 1	< 1	360

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE California
NAME OF AREA - Berryessa
NAME OF SUPPLY - Putah Creek Park
DATE OF SURVEY 11-8-71
TREATMENT - Sand filtration and chlorination

SOURCE Lake
PUMP Submersible
STORAGE Ground level tank and surge tank

BACTERIOLOGICAL SURVEILLANCE - 2 samples/month, June - September

BACTERIOLOGICAL QUALITY - Good

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED - NONE

PHS RECOMMENDED LIMITS EXCEEDED - NONE

OPERATION, CONTROL & SANITARY DEFECTS - 1. Chlorine residuals found at 0'1 points.
2. Chlorine residuals are not checked daily.

COMMENTS 1. The frequency of bacteriological sampling should be increased to meet the PHS during the entire time the system is operational.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)o (0.05)oo	< 0.005	COPPER (1.0)o	0.012	NITRATE (45)o	0.3
BARIUM (1.0)oo	< 0.05	CYANIDE (0.01)o (0.2)oo	0.000	pH	8.2
BORON (1.0)o (5.0)oo	< 0.1	FLUORIDE (1.4 to 2.4)oo		SELENIUM (0.01)oo	0.001
CADMIUM (0.01)oo	0.00	IRON (0.3)o	0.010	SILVER (0.05)oo	0.000
CHLORIDE (250)o	47.0	LEAD (0.05)oo	0.00	SULFATE (250)o	10.0
CHROMIUM (.05)oo	0.00	R.D.A.S. (0.5)o	0.000	TOTAL DISSOLVED SOLIDS (500)o	196.5
COBALT	0.00	MANGANESE (0.05)o	0.00	TURBIDITY (5 s.u.)o	0.83
COLOR (15 s.u.)o	< 5	MERCURY	< 0.0005	ZINC (5.0)o	0.017
		NICKEL	0.00		

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	1	1	280
DISTRIBUTION #1	< 1	< 1	1
DISTRIBUTION #2	< 1	< 1	290

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA Berryessa
NAME OF SUPPLY - Rancho Monticello
DATE OF SURVEY - 11/8/71
TREATMENT - Sand filtration, chlorination

SOURCE - Lake
PUMP - Submersible
STORAGE - Ground level storage tank

BACTERIOLOGICAL SURVEILLANCE 2 samples/month, June-Sept.

BACTERIOLOGICAL QUALITY - Two samples taken in June showed coliform contamination. Remainder of samples are good.

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED - None

PHS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS - 1. Chlorine residuals were found in the distribution system.
2. Not known if daily chlorine residuals are taken.

COMMENTS - 1. The frequency of bacteriological sampling should be increased to meet the PHS during the entire time the system is operational.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)o (0.05)oo	< 0.005	COPPER (1.0)o	0.007	NITRATE (45)o	0.2
BARIUM (1.0)oo	< 0.05	CYANIDE (0.01)o (0.2)oo	0.000	pH	8.0
BORON (1.0)o (5.0)oo	< 0.1	FLUORIDE (1.4 to 2.4)oo		SELENIUM (0.01)oo	0.001
CADMIUM (0.01)oo	0.00	IRON (0.3)o	0.022	SILVER (0.05)oo	0.003
CHLORIDE (250)o	30.0	LEAD (0.05)oo	0.00	SULFATE (250)o	2.3
CHROMIUM (.05)oo	0.00	R.D.A.S. (0.5)o	0.000	TOTAL DISSOLVED SOLIDS (500)o	404.5
COBALT	0.00	MANGANESE (0.05)o	0.00	TURBIDITY (5 s.u.)o	0.45
COLOR (15 s.u.)o	< 5	MERCURY	< 0.0005	ZINC (5.0)o	0.10
		NICKEL	0.0005		

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	23
DISTRIBUTION #2	< 1	< 1	1,000

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Norryesse
NAME OF SUPPLY - South Shore
DATE OF SURVEY - 11/9/71
TREATMENT - Sand filtration, chlorination

SOURCE - Lake
PUMP - Centrifugal
STORAGE - Elevated or ground level storage tanks

BACTERIOLOGICAL SURVEILLANCE 1 Sample in May, 2/month in June-Aug., 1 in Sept.

BACTERIOLOGICAL QUALITY Good

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED None

OPERATION, CONTROL & SANITARY DEFECTS
1. Chlorine residual found in storage tank but not distribution system.
2. Chlorine residuals not checked daily.

COMMENTS 1. The frequency of bacteriological sampling should be increased to meet the PHS during the entire time the system is operational.
2. A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.015	NITRATE (45)*	0.4
BARIUM (1.0)**	< 0.005	CYANIDE (0.01)* (0.2)**	0.000	pH	7.5
BORON (1.0)* (5.0)**	0.248	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.001
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.052	SILVER (0.05)**	0.00
CHLORIDE (250)*	21.0	LEAD (0.05)**	0.00	SULFATE (250)*	17.4
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.030	TOTAL DISSOLVED SOLIDS (500)*	172.5
COBALT	0.00	MANGANESE (0.05)*	0.003	TURBIDITY (5 s.u.)*	0.6
COLOR (15 s.u.)*	<5	MERCURY	< 0.0005	ZINC (5.0)*	0.037
		NICKEL	0.000		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	2	< 1	800
DISTRIBUTION #1	< 1	< 1	12
DISTRIBUTION #2	< 1	< 1	12

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Norryesse
NAME OF SUPPLY South Shore Well
DATE OF SURVEY 10/9/71
TREATMENT - Chlorination

SOURCE Well
PUMP - Submersible
STORAGE - Ground level storage tank

BACTERIOLOGICAL SURVEILLANCE May - 1, June - 4, Aug.-2, Sept. - 2 samples taken.

BACTERIOLOGICAL QUALITY Good

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED Turbidity

OPERATION, CONTROL & SANITARY DEFECTS Chlorine residuals found at all points

COMMENTS The frequency of bacteriological sampling should be increased to meet the PHS the entire time the system is operational.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.011	NITRATE (45)*	12.0
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000	pH	7.5
BORON (1.0)* (5.0)**	0.450	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.005
CADMIUM (0.01)**	0.002	IRON (0.3)*	0.059	SILVER (0.05)**	0.00
CHLORIDE (250)*	37.2	LEAD (0.05)**	0.1[illegible]	SULFATE (250)*	91.5
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.026	TOTAL DISSOLVED SOLIDS (500)*	400.5
COBALT	0.00	MANGANESE (0.05)*	0.024	TURBIDITY (5 s.u.)*	7.9
COLOR (15 s.u.)*	19	MERCURY	0.0005	ZINC (5.0)*	4.25
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	< 1	< 1	390
DISTRIBUTION #1	< 1	< 1	7
DISTRIBUTION #2	< 1	< 1	13

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Berryessa
NAME OF SUPPLY - Spanish Flat
DATE OF SURVEY 1/9/71
TREATMENT - Filtration through diatomaceous earth, chlorination
SOURCE - Lake
PUMP - Submersible
STORAGE - 2 concrete tanks, one pressure tank.

BACTERIOLOGICAL SURVEILLANCE - Feb.-1 sample, June - 3 samples, July-3 samples, Aug.-3 samples, Sept. - 2 samples.

BACTERIOLOGICAL QUALITY
Coliform contamination found in 3 of the above samples.

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS 1. No chlorine residuals found in system.
2. Chlorine residuals not checked daily.

COMMENTS 1. The frequency of bacteriological sampling should be increased to meet the DWS during the entire time the system is operational.

2. A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.005
BARIUM (1.0)**	0.28	CYANIDE (0.01)* (0.2)**	0.000
BORON (1.0)* (5.0)**	0.646	FLUORIDE (1.4 to 2.4)**	
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.000
CHLORIDE (250)*	15.2	LEAD (0.05)**	0.00
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.013
COBALT	0.00	MANGANESE (0.05)*	0.005
COLOR (15 s.u.)*	< 5	MERCURY	< 0.0005
		NICKEL	0.014

NITRATE (45)*	< 0.1
pH	7.4
SELENIUM (0.01)**	0.001
SILVER (0.05)**	0.00
SULFATE (250)*	25.5
TOTAL DISSOLVED SOLIDS (500)*	401.5
TURBIDITY (5 s.u.)*	0.2
ZINC (5.0)*	0.051

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	27	< 1	240
DISTRIBUTION #1	< 1	< 1	4
DISTRIBUTION #2	< 1	< 1	12

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Berryessa
NAME OF SUPPLY - Steele Park
DATE OF SURVEY - 11/9/71
TREATMENT - coagulation, flocculation, sedimentation, filtration, carbon, chlorination
SOURCE - Lake
PUMP - Centrifugal
STORAGE - Underground tanks at plant

BACTERIOLOGICAL SURVEILLANCE 2 samples/month, June-Sept.

BACTERIOLOGICAL QUALITY - 2 of the samples in the past year showed coliform contamination.

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

Chlorine residual found at treatment plant but not in distribution system.

COMMENTS

The frequency of bacteriological sampling should be increased to meet the DWS during the entire time the system is operational.

A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.021
BARIUM (1.0)**	< 0.005	CYANIDE (0.01)* (0.2)**	0.060
BORON (1.0)* (5.0)**	0.390	FLUORIDE (1.4 to 2.4)**	
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.027
CHLORIDE (250)*	17.7	LEAD (0.05)**	0.00
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.030
COBALT	0.00	MANGANESE (0.05)*	0.004
COLOR (15 s.u.)*	< 5	MERCURY	< 0.0005
		NICKEL	0.000

NITRATE (45)*	0.2
pH	7.8
SELENIUM (0.01)**	0.001
SILVER (0.05)**	0.00
SULFATE (250)*	17.9
TOTAL DISSOLVED SOLIDS (500)*	178.5
TURBIDITY (5 s.u.)*	0.9
ZINC (5.0)*	0.007

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	30	1	760
DISTRIBUTION #1	< 1	< 1	70
DISTRIBUTION #2	< 1	< 1	530

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Cachuma
NAME OF SUPPLY - Park Supply
DATE OF SURVEY - 11/17/71
SOURCE - Lake
PUMP - Centrifugal pump
STORAGE - Ground level concrete tank
TREATMENT - Sand filtration and chlorination

BACTERIOLOGICAL SURVEILLANCE - Excellent (average 8 samples/month)

BACTERIOLOGICAL QUALITY - Standards not met one month in past year.

CHEMICAL QUALITY
MAS MANDATORY LIMITS EXCEEDED - None

MAS RECOMMENDED LIMITS EXCEEDED - Total Dissolved Solids, Sulfate

OPERATION, CONTROL & SANITARY DEFECTS

Chlorine residual found in distribution system.

COMMENTS

1. System is well maintained
2. Recommend placement of gas masks outside the door of the treatment plant.

PHYSICAL AND CHEMICAL DATA			
ARSENIC (0.01)• (0.05)••	< 0.005	COPPER (1.0)•	0.019
BARIUM (1.0)••	< 0.05	CYANIDE (0.01)• (0.2)••	0.000
BORON (1.0)• (5.0)••	0.119	FLUORIDE (1.4 to 2.4)••	
CADMIUM (0.01)••	0.00	IRON (0.3)•	0.023
CHLORIDE (250)•	< 5.0	LEAD (0.05)••	0.025
CHROMIUM (.05)••	0.02	M.B.A.S. (0.5)•	0.036
COBALT	0.00	MANGANESE (0.05)•	0.00
COLOR (15 s.u.)•	< 5	MERCURY	0.0010
		NICKEL	0.00

NITRATE (45)•	0.3
pH	7.7
SELENIUM (0.01)••	0.004
SILVER (0.05)••	0.00
SULFATE (250)•	283.0
TOTAL DISSOLVED SOLIDS (500)•	694.0
TURBIDITY (5 s.u.)•	0.35
ZINC (5.0)•	0.027

•RECOMMENDED LIMIT ••MANDATORY LIMIT ALL UNITS ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	9	2	31
DISTRIBUTION #1	< 1	< 1	15
DISTRIBUTION #2	< 1	< 1	7

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA Camp Far West
NAME OF SUPPLY - Recreation Area
DATE OF SURVEY - 11/12/71
SOURCE - Lake
PUMP - Submersible
STORAGE - Pressure tank
TREATMENT - Chlorination, sand filtration, carbon filtration

BACTERIOLOGICAL SURVEILLANCE - 2 samples taken in year prior to survey

BACTERIOLOGICAL QUALITY Good at time of survey

CHEMICAL QUALITY
MAS MANDATORY LIMITS EXCEEDED - None

MAS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

No chlorine residual found in distribution system

COMMENTS

1. Chlorinator should be moved to outlet of the carbon filter so that a chlorine residual can be maintained in the distribution system.
2. Bacteriological surveillance should be increased to meet the MAS.

PHYSICAL AND CHEMICAL DATA			
ARSENIC (0.01)• (0.05)••	< 0.005	COPPER (1.0)•	0.016
BARIUM (1.0)••	< 0.05	CYANIDE (0.01)• (0.2)••	0.000
BORON (1.0)• (5.0)••	< 0.1	FLUORIDE (1.4 to 2.4)••	
CADMIUM (0.01)••	0.00	IRON (0.3)•	0.00
CHLORIDE (250)•	< 5.0	LEAD (0.05)••	0.00
CHROMIUM (.05)••	0.00	M.B.A.S. (0.5)•	0.020
COBALT	0.00	MANGANESE (0.05)•	0.00
COLOR (15 s.u.)•	< 5	MERCURY	0.0010
		NICKEL	0.00

NITRATE (45)•	0.7
pH	7.3
SELENIUM (0.01)••	<0.001
SILVER (0.05)••	0.00
SULFATE (250)•	5.8
TOTAL DISSOLVED SOLIDS (500)•	90.5
TURBIDITY (5 s.u.)•	0.47
ZINC (5.0)•	0.020

•RECOMMENDED LIMIT ••MANDATORY LIMIT ALL UNITS ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	< 1	< 1	190
DISTRIBUTION #1	< 1	< 1	26
DISTRIBUTION #2	< 1	< 1	31

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE California
NAME OF AREA - Contra Loma
NAME OF SUPPLY - Picnic Area
DATE OF SURVEY 11/10/71
TREATMENT - Chlorination

SOURCE - Unknown
PUMP - Unknown
STORAGE - Ground level tank

BACTERIOLOGICAL SURVEILLANCE - No records of any tests could be found at the Contra Costa County Health Department.

BACTERIOLOGICAL QUALITY - Good at time of survey

CHEMICAL QUALITY
PMS MANDATORY LIMITS EXCEEDED - None

PMS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS - No chlorine residual found in storage tank or distribution system.

COMMENTS
1. Water is delivered by truck from Antioch, California
2. Due to the large number of avenues of contamination, a chlorine residual should be maintained at all times and frequent bacteriological tests should be made.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	0.007	NITRATE (45)*	0.1
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000	pH	7.1
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.001
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.047	SILVER (0.05)**	0.00
CHLORIDE (250)*	39.0	LEAD (0.05)**	0.00	SULFATE (250)*	43.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.013	TOTAL DISSOLVED SOLIDS (500)*	220.0
COBALT	0.00	MANGANESE (0.05)*	0.004	TURBIDITY (5 s.u.)*	0.47
COLOR (15 s.u.)*	< 5	MERCURY	< 0.0005	ZINC (5.0)*	1.3
		NICKEL	0.000		

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	68
DISTRIBUTION #2	< 1	< 1	140

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Castlas
NAME OF SUPPLY - Water District
DATE OF SURVEY - 11/10/71
TREATMENT - Chlorination

SOURCE - Lake
PUMP - None at intake
STORAGE - Ground level storage tanks

BACTERIOLOGICAL SURVEILLANCE - Excellent (average 32 samples/month)

BACTERIOLOGICAL QUALITY - High standard plate count

CHEMICAL QUALITY
PMS MANDATORY LIMITS EXCEEDED - None

PMS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

Chlorine residual found in distribution system.

COMMENTS

Treatment facilities are in good condition.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.023	NITRATE (45)*	
BARIUM (1.0)**	< 0.000	CYANIDE (0.01)* (0.2)**		pH	7.7
BORON (1.0)* (5.0)**		FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.026	SILVER (0.05)**	0.00
CHLORIDE (250)*		LEAD (0.05)**	0.016	SULFATE (250)*	
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*		TOTAL DISSOLVED SOLIDS (500)*	
COBALT	0.000	MANGANESE (0.05)*	0.000	TURBIDITY (5 s.u.)*	
COLOR (15 s.u.)*		MERCURY	< 0.0005	ZINC (5.0)*	0.16
		NICKEL	0.000		

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER	1	1	170
DISTRIBUTION #1	< 1	< 1	1
DISTRIBUTION #2	< 1	< 1	1,500

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Folsom
NAME OF SUPPLY - Beals Point
DATE OF SURVEY - 11/11/71
TREATMENT - Unknown

SOURCE - Lake
PUMP - Unknown
STORAGE - Unknown

BACTERIOLOGICAL SURVEILLANCE - 2 samples taken in year prior to survey of water treated by the San Juan Water District

BACTERIOLOGICAL QUALITY - Good

CHEMICAL QUALITY -
DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS - No chlorine residual found

COMMENTS
1. Water purchased from San Juan Water District
2. Booster chlorination should be installed if a chlorine residual cannot be maintained.
3. A bacteriological surveillance program should be practiced in accordance with the DWS.

PHYSICAL AND CHEMICAL DATA			
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.006
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**	
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.053
CHLORIDE (250)*	<5.0	LEAD (0.05)**	0.016
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.013
COBALT	0.00	MANGANESE (0.05)*	0.00
COLOR (15 s.u.)*	8	MERCURY	< 0.0005
		NICKEL	0.00

PHYSICAL AND CHEMICAL DATA			
NITRATE (45)*	0.1		
pH	9.0		
SELENIUM (0.01)**	0.002		
SILVER (0.05)**	0.00		
SULFATE (250)*	4.9		
TOTAL DISSOLVED SOLIDS (500)*	70.0		
TURBIDITY (5 s.u.)*	2.5		
ZINC (5.0)*	0.59		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	8
DISTRIBUTION #2	< 1	< 1	10

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Folsom
NAME OF SUPPLY - Brown's Ravine
DATE OF SURVEY - 11/11/71
TREATMENT - Chlorination

SOURCE - Lake
PUMP - Centrifugal pump
STORAGE - 2 pressure tanks

BACTERIOLOGICAL SURVEILLANCE - None on record

BACTERIOLOGICAL QUALITY - High standard plate count on day of survey.

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS
1. Chlorinator was leaking and not working on day of visit.
2. Chlorine residuals should be checked daily.

COMMENTS
1. With evidence of fecal contamination in the raw water, strict control over the chlorination is a necessity
2. A bacteriological surveillance program should be practiced in accordance with the DWS.

PHYSICAL AND CHEMICAL DATA			
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.015
BARIUM (1.0)**	< 0.01	CYANIDE (0.01)* (0.2)**	0.000
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**	
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.016
CHLORIDE (250)*	< 5.0	LEAD (0.05)**	0.00
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.020
COBALT	0.00	MANGANESE (0.05)*	0.010
COLOR (15 s.u.)*	< 5	MERCURY	< 0.0005
		NICKEL	0.00

PHYSICAL AND CHEMICAL DATA	
NITRATE (45)*	0.2
pH	7.0
SELENIUM (0.01)**	0.001
SILVER (0.05)**	0.00
SULFATE (250)*	1.9
TOTAL DISSOLVED SOLIDS (500)*	58.5
TURBIDITY (5 s.u.)*	1.2
ZINC (5.0)*	0.60

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	1	1	980
DISTRIBUTION #1	< 1	< 1	65,000
DISTRIBUTION #2	< 1	< 1	31

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Folsom
NAME OF SUPPLY - San Supply
DATE OF SURVEY - 11/11/71
TREATMENT - Chlorination

SOURCE - Lake
PUMP - None from intake to chlorinator
STORAGE - Elevated storage tank

BACTERIOLOGICAL SURVEILLANCE None on record

BACTERIOLOGICAL QUALITY High standard plate count at time of survey.

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS - No chlorine residual found in distribution system.

COMMENTS - 1. A bacteriological surveillance program should be practiced in accordance with the DWS.

2. Chlorine residuals should be checked daily.

3. A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA			
ARSENIC (0.01)*<0.005 (0.05)**	COPPER (1.0)* 0.013	NITRATE (45)* <0.1
BARIUM (1.0)** < 0.05	CYANIDE (0.01)* 0.000 (0.2)**	pH 9.1
BORON (1.0)* < 0.1 (5.0)**	FLUORIDE (1.4 to 2.4)**	SELENIUM (0.01)** 0.001
CADMIUM (0.01)** 0.00	IRON (0.3)* 0.017	SILVER (0.05)** 0.003
CHLORIDE (250)*<5.0	LEAD (0.05)** 0.00	SULFATE (250)* 2.1
CHROMIUM (.05)** 0.00	M.B.A.S. (0.5)* 0.030	TOTAL DISSOLVED SOLIDS (500)* 69.0
COBALT 0.00	MANGANESE (0.05)* 0.003	TURBIDITY (5 s.u.)* 0.95
COLOR (15 s.u.)* <5	MERCURY<0.0005	ZINC (5.0)* 0.019
*RECOMMENDED LIMIT **MANDATORY LIMIT	NICKEL 0.00	ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	1	1	100
DISTRIBUTION #1	< 1	< 1	16,000
DISTRIBUTION #2	< 1	< 1	190

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Folsom
NAME OF SUPPLY - Granite Bay
DATE OF SURVEY - 11/11/71
TREATMENT - Unknown

SOURCE - Lake
PUMP - Unknown
STORAGE - Unknown

BACTERIOLOGICAL SURVEILLANCE - 2 samples taken in year prior to survey of water treated by the San Juan Water District.

BACTERIOLOGICAL QUALITY - Good

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS - No chlorine residual found

COMMENTS
1. Water purchased from San Juan Water District
2. Booster chlorination should be installed if a chlorine residual cannot be maintained.
3. A bacteriological surveillance program should be practiced in accordance with the DWS.

PHYSICAL AND CHEMICAL DATA			
ARSENIC (0.01)*<0.005 (0.05)**	COPPER (1.0)* 0.010	NITRATE (45)* 0.1
BARIUM (1.0)** < 0.05	CYANIDE (0.01)* 0.000 (0.2)**	pH 8.7
BORON (1.0)* <0.1 (5.0)**	FLUORIDE (1.4 to 2.4)**	SELENIUM (0.01)** 0.001
CADMIUM (0.01)** 0.00	IRON (0.3)* 0.033	SILVER (0.05)** 0.00
CHLORIDE (250)* 80.0	LEAD (0.05)** 0.00	SULFATE (250)* 5.4
CHROMIUM (.05)** 0.00	M.B.A.S. (0.5)* 0.013	TOTAL DISSOLVED SOLIDS (500)* 71.0
COBALT 0.00	MANGANESE (0.05)* 0.005	TURBIDITY (5 s.u.)* 3.8
COLOR (15 s.u.)* 8	MERCURY<0.0005	ZINC (5.0)* 0.34
*RECOMMENDED LIMIT **MANDATORY LIMIT	NICKEL 0.00	ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	830
DISTRIBUTION #2	< 1	< 1	370

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Folsom
NAME OF SUPPLY - Negro Bar
DATE OF SURVEY - 11/11/71
TREATMENT Unknown

SOURCE Lake
PUMP Unknown
STORAGE Unknown

BACTERIOLOGICAL SURVEILLANCE 2 samples taken in year prior to survey of water treated by the San Juan Water District.

BACTERIOLOGICAL QUALITY Good

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED None

OPERATION, CONTROL & SANITARY DEFECTS No chlorine residual found

COMMENTS
1. Water purchased from San Juan Water District.
2. Booster chlorination should be installed if a chlorine residual cannot be maintained.
3. A bacteriological surveillance program should be practiced in accordance with the PHS.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)* 0.006	NITRATE (45)* 0.1
BARIUM (1.0)**	0.05	CYANIDE (0.01)* (0.2)** 0.000	pH 7.2
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**	SELENIUM (0.01)** 0.001
CADMIUM (0.01)**	0.00	IRON (0.3)* 0.052	SILVER (0.05)** 0.00
CHLORIDE (250)*	< 5.0	LEAD (0.05)** 0.016	SULFATE (250)* 5.2
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)* 0.010	TOTAL DISSOLVED SOLIDS (500)* 59.5
COBALT	0.00	MANGANESE (0.05)* 0.00	TURBIDITY (5 s.u.)* 0.78
COLOR (15 s.u.)*	<5	MERCURY <0.0005	ZINC (5.0)* 0.027
		NICKEL 0.00	

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	200
DISTRIBUTION #2	< 1	< 1	48

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA Folsom
NAME OF SUPPLY - Peninsula Campground
DATE OF SURVEY 11/11/71
TREATMENT - Chlorination, Filtration

SOURCE - Lake
PUMP Submersible
STORAGE Ground level storage tank

BACTERIOLOGICAL SURVEILLANCE None on record

BACTERIOLOGICAL QUALITY High standard plate count on day of survey.

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED None

OPERATION, CONTROL & SANITARY DEFECTS
1. Chlorine residuals not taken daily
2. A chlorine residual was found in the distribution system.

COMMENTS
1. A bacteriological surveillance program should be practiced in accordance with the PHS.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)* 0.004	NITRATE (45)*
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	pH 7.6
BORON (1.0)* (5.0)**		FLUORIDE (1.4 to 2.4)**	SELENIUM (0.01)** < 0.005
CADMIUM (0.01)**	0.00	IRON (0.3)* 0.017	SILVER (0.05)** 0.003
CHLORIDE (250)*	< 10	LEAD (0.05)** 0.016	SULFATE (250)* < 25
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)* <0.05	TOTAL DISSOLVED SOLIDS (500)* 50
COBALT	0.00	MANGANESE (0.05)* 0.00	TURBIDITY (5 s.u.)* .20
COLOR (15 s.u.)*	5	MERCURY < 0.0005	ZINC (5.0)* 0.036
		NICKEL 0.00	

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	47,000
DISTRIBUTION #2	< 1	< 1	23

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA Lake Amador
NAME OF SUPPLY Lake Amador
DATE OF SURVEY 11/10/71
TREATMENT Filtration and chlorination

SOURCE Lake Amador
PUMP Power
STORAGE Large hydropneumatic tank

BACTERIOLOGICAL SURVEILLANCE 9 samples per year.

BACTERIOLOGICAL QUALITY High standard plate count at time of survey; sampling for last year showed 33% having 3 or more positive tubes for coliform.

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED Manganese

OPERATION, CONTROL & SANITARY DEFECTS Chlorine residual was not maintained in the distribution system; records were negligible or not available.

COMMENTS
1. Improvements should be made to maintain a chlorine residual of 0.1 - 0.2 ppm at all points in the distribution system; this should be regularly measured.

2. The rate of bacteriological sampling should be increased to twice per month.

3. Regular records should be kept for treatment operations, chlorine residual determinations, bacteriological results, etc.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.0005	COPPER (1.0)*	0.012	NITRATE (45)*	0.3
BARIUM (1.0)**	< 0.03	CYANIDE (0.01)* (0.2)**	0.0	pH	7.3
BORON (1.0)* (5.0)**	0.169	FLUORIDE (1.4 to 2.4)**	--	SELENIUM (0.01)**	0.004
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.13	SILVER (0.05)**	0.00
CHLORIDE (250)*	< 5.0	LEAD (0.05)**	0.00	SULFATE (250)*	17.8
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.030	TOTAL DISSOLVED SOLIDS (500)*	144.5
COBALT	0.00	MANGANESE (0.05)*	0.24	TURBIDITY (5 s.u.)*	1.0
COLOR (15 s.u.)*	15	MERCURY	0.0008	ZINC (5.0)*	0.048
		NICKEL	0.008		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	3	1	650
DISTRIBUTION #1	< 1	< 1	20,000
DISTRIBUTION #2	< 1	< 1	4,900

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Los Banos
NAME OF SUPPLY - Large Campground
DATE OF SURVEY - 11/15/71
TREATMENT

SOURCE - Water to hauled from the
PUMP San Luis-O'Neil Pressure System
STORAGE - Small steel tank

BACTERIOLOGICAL SURVEILLANCE - None

BACTERIOLOGICAL QUALITY Fecal contamination found in water.
High standard plate count.

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED - None

PHS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

No chlorine residual found in system

COMMENTS
1. Due to the many possible avenues of contamination, the chlorine residual should be kept up and checked daily.
2. Care should be taken in the transport of the water. The source of the water must be safe.
3. A bacteriological surveillance program should be instituted in accordance with the PHS.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.023	NITRATE (45)*	1.6
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000	pH	7.5
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	< 0.001
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.034	SILVER (0.05)**	0.00
CHLORIDE (250)*	21.5	LEAD (0.05)**	0.00	SULFATE (250)*	55.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.036	TOTAL DISSOLVED SOLIDS (500)*	277.0
COBALT	0.00	MANGANESE (0.05)*	0.00	TURBIDITY (5 s.u.)*	0.4
COLOR (15 s.u.)*	< 5	MERCURY	< 0.0005	ZINC (5.0)*	0.082
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	29	4	1,700
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Merle Collins
NAME OF SUPPLY - Campground
DATE OF SURVEY - 11/12/71
TREATMENT - None

SOURCE Well
PUMP - Submersible
STORAGE - Pressure tank

BACTERIOLOGICAL SURVEILLANCE - 1 sample taken in year prior to survey

BACTERIOLOGICAL QUALITY Good at time of survey

CHEMICAL QUALITY

DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

Well, pump, and pressure tanks are in good condition.

COMMENTS

Bacteriological surveillance program should be increased to meet the DWS.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)** < 0.005	COPPER (1.0)* 0.025	NITRATE (45)* < 0.1
BARIUM (1.0)** < 0.05	CYANIDE (0.01)* (0.2)** 0.000	pH 7.5
BORON (1.0)* (5.0)** < 0.1	FLUORIDE (1.4 to 2.4)**	SELENIUM (0.01)** < 0.001
CADMIUM (0.01)** 0.006	IRON (0.3)* 0.00	SILVER (0.05)** 0.00
CHLORIDE (250)* < 5.0	LEAD (0.05)** 0.051	SULFATE (250)* 10.1
CHROMIUM (.05)** 0.00	M.B.A.S. (0.5)* 0.010	TOTAL DISSOLVED SOLIDS (500)* 233.0
COBALT 0.00	MANGANESE (0.05)* 0.035	TURBIDITY (5 s.u.)* 0.22
COLOR (15 s.u.)* < 5	MERCURY < 0.0005	ZINC (5.0)* 0.071
	NICKEL 0.00	

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	180
DISTRIBUTION #2	< 1	< 1	19

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Millerton
NAME OF SUPPLY - Dam Supply
DATE OF SURVEY - 11/13/71
TREATMENT - Chlorination

SOURCE - Lake
PUMP - Type unknown
STORAGE - Ground level storage tank

BACTERIOLOGICAL SURVEILLANCE - Unknown

BACTERIOLOGICAL QUALITY Good at time of survey

CHEMICAL QUALITY

DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

Chlorine residual found in distribution system.

COMMENTS

Bacteriological surveillance should meet the DWS.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)** 0.005	COPPER (1.0)* 0.020	NITRATE (45)* 0.5
BARIUM (1.0)** 0.03	CYANIDE (0.01)* (0.2)** 0.000	pH 6.9
BORON (1.0)* (5.0)** < 0.1	FLUORIDE (1.4 to 2.4)**	SELENIUM (0.01)** 0.001
CADMIUM (0.01)** 0.00	IRON (0.3)* 0.071	SILVER (0.05)** 0.00
CHLORIDE (250)* < 5.0	LEAD (0.05)** 0.016	SULFATE (250)* 1.2
CHROMIUM (.05)** 0.000	M.B.A.S. (0.5)* 0.013	TOTAL DISSOLVED SOLIDS (500)* 50.5
COBALT 0.00	MANGANESE (0.05)* 0.011	TURBIDITY (5 s.u.)* 2.2
COLOR (15 s.u.)* < 5	MERCURY < 0.0005	ZINC (5.0)* 0.092
	NICKEL 0.004	

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	150
DISTRIBUTION #2	1	< 1	3

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Millerton
NAME OF SUPPLY - Ft. Miller
DATE OF SURVEY - 11/16/71
TREATMENT - Chlorination

SOURCE - Lake
PUMP - Submersible
STORAGE - Ground level concrete tank

BACTERIOLOGICAL SURVEILLANCE - Unknown

BACTERIOLOGICAL QUALITY - High standard plate count at time of survey

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - Turbidity, Iron, Zinc

OPERATION, CONTROL & SANITARY DEFECTS

Chlorinator was turned off at time of survey. No chlorine residual found.

COMMENTS

Chlorine residuals should be checked daily.
Bacteriological surveillance should meet the DWS.
A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	0.016	COPPER (1.0)*	0.068	NITRATE (45)*	1.1
BARIUM (1.0)**	0.08	CYANIDE (0.01)* (0.2)**	0.000	pH	6.7
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	0.001
CADMIUM (0.01)**	0.007	IRON (0.3)*	4.2	SILVER (0.05)**	0.00
CHLORIDE (250)*	< 5.0	LEAD (0.05)**	0.16	SULFATE (250)*	2.1
CHROMIUM (.05)**	0.007	M.B.A.S. (0.5)*	0.017	TOTAL DISSOLVED SOLIDS (500)*	45.0
COBALT	0.0	MANGANESE (0.05)*	0.069	TURBIDITY (5 s.u.)*	5.7
COLOR (15 s.u.)*	15	MERCURY	< 0.0005	ZINC (5.0)*	18.3
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	1	1	63,000
DISTRIBUTION #2	1	1	200

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Millerton
NAME OF SUPPLY - Meadow
DATE OF SURVEY 11/16/71
TREATMENT - Chlorination

SOURCE - Lake
PUMP - Submersible
STORAGE - Ground level concrete tank

BACTERIOLOGICAL SURVEILLANCE - Unknown

BACTERIOLOGICAL QUALITY - High standard plate count at time of survey

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

No chlorine residual found in distribution system.

COMMENTS

1. Chlorine residual should be checked daily
2. Bacteriological surveillance should meet the DWS.
3. A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.027	NITRATE (45)*	0.3
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000	pH	6.9
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**		SELENIUM (0.01)**	<0.001
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.081	SILVER (0.05)**	0.003
CHLORIDE (250)*	< 5.0	LEAD (0.05)**	0.016	SULFATE (250)*	< 1.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.013	TOTAL DISSOLVED SOLIDS (500)*	47.0
COBALT	0.00	MANGANESE (0.05)*	0.004	TURBIDITY (5 s.u.)*	1.0
COLOR (15 s.u.)*	<5	MERCURY	<0.0005	ZINC (5.0)*	0.37
		NICKEL	0.00		

*RECOMMENDED LIMIT **MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	12	14	890
DISTRIBUTION #1	< 1	< 1	220
DISTRIBUTION #2	< 1	< 1	5,100

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - O'Neil
NAME OF SUPPLY - Campground
DATE OF SURVEY - 11/15/72
TREATMENT -

SOURCE - Water is hauled from the
PUMP San Luis O'Neil Pressure System
STORAGE - Small Steel Tank

BACTERIOLOGICAL SURVEILLANCE - None

BACTERIOLOGICAL QUALITY Good at time of survey

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED - None

DWS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

No chlorine residual found in system

COMMENTS

1. Due to the many possible avenues of contamination, the chlorine residual should be kept up and checked daily.
2. Care should be taken in the transport of the water. The source of the water must be safe.
3. A bacteriological surveillance program should be instituted in accordance with the DWS.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)*	< 0.005	COPPER (1.0)* 0.010	NITRATE (45)* 1.2
(0.05)**		CYANIDE (0.01)* 0.000	pH 7.5
BARIUM (1.0)**	< 0.05	(0.2)**	SELENIUM (0.01)** < 0.001
BORON (1.0)*	< 0.1	FLUORIDE (1.4 to 2.4)**	SILVER (0.05)** 0.006
(5.0)**		IRON (0.3)* 0.011	SULFATE (250)* 56.0
CADMIUM (0.01)**	0.00	LEAD (0.05)** 0.00	TOTAL DISSOLVED SOLIDS (500)* 270.0
CHLORIDE (250)*	17.7	M.B.A.S. (0.5)* 0.026	TURBIDITY (5 s.u.)* 0.55
CHROMIUM (.05)**	0.00	MANGANESE (0.05)* 0.00	ZINC (5.0)* 0.033
COBALT	0.00	MERCURY < 0.0005	
COLOR (15 s.u.)*	< 5	NICKEL 0.00	

*RECOMMENDED LIMIT **MANDATORY LIMIT — ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	1	< 1	600
DISTRIBUTION #2			

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA - Red Bluff
NAME OF SUPPLY Campground
DATE OF SURVEY 11/11/71
TREATMENT - None

SOURCE Well
PUMP Jet pump
STORAGE - Pressure tank

BACTERIOLOGICAL SURVEILLANCE 1 sample collected in past year

BACTERIOLOGICAL QUALITY Good

CHEMICAL QUALITY
DWS MANDATORY LIMITS EXCEEDED None

DWS RECOMMENDED LIMITS EXCEEDED None

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS

1. Should collect samples for bacteriological examination at the rate specified in the DWS.
2. Should install chlorination equipment and maintain a chlorine residual throughout the system.
3. The well and distribution system were properly constructed and well maintained.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)*	< 0.005	COPPER (1.0)* 0.008	NITRATE (45)* 0.2
(0.05)**		CYANIDE (0.01)* 0.0	pH 6.9
BARIUM (1.0)**	< 0.05	(0.2)**	SELENIUM (0.01)** 0.002
BORON (1.0)*	0.218	FLUORIDE (1.4 to 2.4)**	SILVER (0.05)** 0.00
(5.0)**		IRON (0.3)* 0.080	SULFATE (250)* 3.7
CADMIUM (0.01)**	0.00	LEAD (0.05)** 0.00	TOTAL DISSOLVED SOLIDS (500)* 94.5
CHLORIDE (250)*	< 5.0	M.B.A.S. (0.5)* 0.013	TURBIDITY (5 s.u.)* 4.7
CHROMIUM (.05)**	0.00	MANGANESE (0.05)* 0.004	ZINC (5.0)* 0.093
COBALT	0.00	MERCURY 0.0022	
COLOR (15 s.u.)*	8	NICKEL 0.003	

*RECOMMENDED LIMIT **MANDATORY LIMIT — ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	640
DISTRIBUTION #2	< 1	< 1	780

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA San Luis
NAME OF SUPPLY - Pressure System
DATE OF SURVEY 11/15/71
SOURCE - Lake
PUMP - No pump at source
STORAGE - Pressure tank
TREATMENT - Coagulation, flocculation, settling, filtration, chlorination

BACTERIOLOGICAL SURVEILLANCE - 32 samples/year

BACTERIOLOGICAL QUALITY Good

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED - None

PHS RECOMMENDED LIMITS EXCEEDED - None

OPERATION, CONTROL & SANITARY DEFECTS

No chlorine residual found

COMMENTS

The system is in good condition

A chlorine residual of 0.1 to 0.2 ppm should be maintained at all times in the distribution system.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.009
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**	
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.011
CHLORIDE (250)*	17.8	LEAD (0.05)**	0.017
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.013
COBALT	0.00	MANGANESE (0.05)*	0.006
COLOR (15 c.u.)*	< 5	MERCURY	< 0.0005
		NICKEL	0.00

NITRATE (45)*	1.4
pH	7.7
SELENIUM (0.01)**	< 0.001
SILVER (0.01)**	0.000
SULFATE (250)*	45.9
TOTAL DISSOLVED SOLIDS (500)*	200.5
TURBIDITY (5 s.u.)*	0.39
ZINC (5.0)*	0.006

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	100	1	1,000
DISTRIBUTION #1	< 1	< 1	35
DISTRIBUTION #2	< 1	< 1	90

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA Sly Park Dam
NAME OF SUPPLY Campground #1
DATE OF SURVEY 11/17/71
SOURCE Springs
PUMP Power
STORAGE 4,000 gal
TREATMENT None at time of survey; chlorination in the summer

BACTERIOLOGICAL SURVEILLANCE 6 per year

BACTERIOLOGICAL QUALITY High standard plate count

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED Iron

OPERATION, CONTROL & SANITARY DEFECTS

The springs were inadequately protected; records were inadequate.

COMMENTS
1. This system should be chlorinated at all times.
2. The bacteriological sampling rate should be increased to twice a month.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.019
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**	--
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.00
CHLORIDE (250)*	4.0	LEAD (0.05)**	0.00
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.013
COBALT	0.00	MANGANESE (0.05)*	0.00
COLOR (15 c.u.)*	< 5	MERCURY	< 0.0005
		NICKEL	0.00

NITRATE (45)*	0.2
pH	7.2
SELENIUM (0.01)**	< 0.001
SILVER (0.05)**	0.00
SULFATE (250)*	< 1.0
TOTAL DISSOLVED SOLIDS (500)*	150.9
TURBIDITY (5 s.u.)*	0.65
ZINC (5.0)*	10.0

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	4,500
DISTRIBUTION #2	< 1	< 1	1,500

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE: CALIFORNIA
NAME OF AREA: Ely Park Dam
NAME OF SUPPLY: Diamond Springs Main
DATE OF SURVEY: 11/12/71
TREATMENT: Coagulation, sedimentation, and chlorination

SOURCE: Jenkinson Reservoir
PUMP: Power
STORAGE: Unknown but large

BACTERIOLOGICAL SURVEILLANCE: 24 samples per year

BACTERIOLOGICAL QUALITY: Review of annual results indicate that coliform limits were exceeded on two months (3/71 and 4/71).

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED: None

PHS RECOMMENDED LIMITS EXCEEDED: None

OPERATION, CONTROL & SANITARY DEFECTS: Chlorin: residual was not maintained to all points in the distribution system.

COMMENTS

1. Improvements should be instituted to assure maintenance of chlorine residual of 0.1 - 0.2 ppm to all points in the distribution system (with regular checking).

2. Estimated populations of the service area (8,000) would call for bacteriological sampling frequency of 9 per month (108/yr); this would require an increase in rate.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)• (0.05)••	< 0.005	COPPER (1.0)•	0.015	NITRATE (45)•	0.4
BARIUM (1.0)••	< 0.05	CYANIDE (0.01)• (0.2)••	0.000	pH	6.9
BORON (1.0)• (5.0)••	< 0.1	FLUORIDE (1.4 to 2.4)••	---	SELENIUM (0.01)••	< 0.001
CADMIUM (0.01)••	0.00	IRON (0.3)•	0.00	SILVER (0.05)••	0.00
CHLORIDE (250)•	< 5.0	LEAD (0.05)••	0.00	SULFATE (250)•	1.5
CHROMIUM (.05)••	0.00	R.B.A.S. (0.5)•	0.000	TOTAL DISSOLVED SOLIDS (500)•	70.6
COBALT	0.00	MANGANESE (0.05)•	0.00	TURBIDITY (5 s.u.)•	3.0
COLOR (15 s.u.)•	0	MERCURY	0.0000	ZINC (5.0)•	0.020
		SELENIUM	0.00		

• RECOMMENDED LIMIT •• MANDATORY LIMIT

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	1,000	1,000	22,000
DISTRIBUTION #1	< 1	< 1	19
DISTRIBUTION #2	< 1	< 1	24

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE: CALIFORNIA
NAME OF AREA: Ely Park Dam
NAME OF SUPPLY: El Dorado Main
DATE OF SURVEY: 11/11/71
TREATMENT: Chlorination

SOURCE: Jenkinson Reservoir
PUMP: Power
STORAGE: Unknown but large

BACTERIOLOGICAL SURVEILLANCE: 97 samples/year

BACTERIOLOGICAL QUALITY: High standard plate c- unt; review of annual records shows that coliform limits were exceeded for one month (10/70)

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED: None

PHS RECOMMENDED LIMITS EXCEEDED: None

OPERATION, CONTROL & SANITARY DEFECTS: Chlorine residual was not maintained at all points in the distribution system.

COMMENTS

1. Improvements should be instituted to assure maintenance of chlorine residuals of 0.1 - 0.2 ppm to all parts of the distribution system (with regular checking).

2. Estimated population of the service area (8,000) excluding town of Pierceville, would call for a bacteriological sampling frequency of 9 per month (108/yr); this would require an increase in rate.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)• (0.05)••	< 0.005	COPPER (1.0)•	0.037	NITRATE (45)•	0.9
BARIUM (1.0)••	< 0.05	CYANIDE (0.01)• (0.2)••	0.000	pH	8.7
BORON (1.0)• (5.0)••	< 0.1	FLUORIDE (1.4 to 2.4)••	---	SELENIUM (0.01)••	< 0.001
CADMIUM (0.01)••	0.00	IRON (0.3)•	0.00	SILVER (0.05)••	0.00
CHLORIDE (250)•	< 5.0	LEAD (0.05)••	0.013	SULFATE (250)•	< 5.0
CHROMIUM (.05)••	0.00	R.B.A.S. (0.5)•	0.039	TOTAL DISSOLVED SOLIDS (500)•	74.5
COBALT	0.00	MANGANESE (0.05)•	0.010	TURBIDITY (5 s.u.)•	1.0
COLOR (15 s.u.)•	0	MERCURY	0.0000	ZINC (5.0)•	0.12
		SELENIUM	0.00		

• RECOMMENDED LIMIT •• MANDATORY LIMIT

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	< 1	< 1	120
DISTRIBUTION #1	< 1	< 1	2,980
DISTRIBUTION #2	1	< 1	1

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA Sly Park Dam
NAME OF SUPPLY Pipe to Sheridan Canal
DATE OF SURVEY 11/11/71
TREATMENT ...egulation, Sedimentation, and chlorination

SOURCE American River, Jenkinson Reservoir
PUMP Power
STORAGE Unknown but large

BACTERIOLOGICAL SURVEILLANCE 23 samples per year.

BACTERIOLOGICAL QUALITY High standard plate count; review of annual results indicates that coliform limits were exceeded for two months (10/70 and 7/71).

CHEMICAL QUALITY
DHS MANDATORY LIMITS EXCEEDED None

DHS RECOMMENDED LIMITS EXCEEDED None

OPERATION, CONTROL & SANITARY DEFECTS Chlorine residual was not maintained to all points in the system.

COMMENTS
1. Improvements should be instituted to assure maintenance of chlorine residuals of 0.1 - 0.2 ppm to all parts of the distribution system (with regular checking).

2. Estimated population of the service area (4,000) would call for bacteriological sampling frequency of 4 per month (48/yr); this would require an increase in rate.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)◆ (0.05)◆◆	< 0.005	COPPER (1.0)◆	0.013	NITRATE (45)◆	0.3
BARIUM (1.0)◆◆	< 0.05	CYANIDE (0.01)◆ (0.2)◆◆	0.000	pH	7.1
BORON (1.0)◆ (5.0)◆◆	< 0.1	FLUORIDE (1.4 to 2.4)◆◆	--	SELENIUM (0.01)◆◆	< 0.001
CADMIUM (0.01)◆◆	0.00	IRON (0.3)◆	0.010	SILICA (0.05)◆◆	0.00
CHLORIDE (250)◆	< 5.0	LEAD (0.05)◆◆	0.00	SULFATE (250)◆	< 1.0
CHROMIUM (.05)◆◆	0.00	M.B.A.S. (0.5)◆	0.013	TOTAL DISSOLVED SOLIDS (500)◆	50.0
COBALT	0.00	MANGANESE (0.05)◆	0.00	TURBIDITY (5 s.u.)◆	0.5
COLOR (15 c.u.)◆	< 5	MERCURY	< 0.0005	ZINC (5.0)◆	0.000
		NICKEL	0.00		

◆ MANDATORY LIMIT ◆◆ RECOMMENDED LIMIT

ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	60	40	1,500
DISTRIBUTION #1	< 1	< 1	50
DISTRIBUTION #2	< 1	< 1	1,600

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA Sly Park Dam
NAME OF SUPPLY Sandy Residence-Campground
DATE OF SURVEY 11/11/71
TREATMENT None

SOURCE Jenkinson Reservoir
PUMP Power
STORAGE 5,000 gal

BACTERIOLOGICAL SURVEILLANCE 3 samples per year

BACTERIOLOGICAL QUALITY Coliform, fecal coliform, and high standard plate count.

CHEMICAL QUALITY
DHS MANDATORY LIMITS EXCEEDED None

DHS RECOMMENDED LIMITS EXCEEDED None

OPERATION, CONTROL & SANITARY DEFECTS Use of a surface water with no chlorination or other treatment.

COMMENTS
1. This water supply should be chlorinated to a residual of 0.1 - 0.2 ppm in the distribution system.

2. The rate of bacteriological sampling should be increased to twice per month.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)◆ (0.05)◆◆	< 0.005	COPPER (1.0)◆	0.020	NITRATE (45)◆	< 0.1
BARIUM (1.0)◆◆	< 0.05	CYANIDE (0.01)◆ (0.2)◆◆	0.000	pH	6.8
BORON (1.0)◆ (5.0)◆◆	< 0.1	FLUORIDE (1.4 to 2.4)◆◆	--	SELENIUM (0.01)◆◆	< 0.001
CADMIUM (0.01)◆◆	0.00	IRON (0.3)◆	0.016	SILICA (0.05)◆◆	0.00
CHLORIDE (250)◆	< 5.0	LEAD (0.05)◆◆	0.00	SULFATE (250)◆	< 1.0
CHROMIUM (.05)◆◆	0.00	M.B.A.S. (0.5)◆	0.013	TOTAL DISSOLVED SOLIDS (500)◆	90.0
COBALT	0.00	MANGANESE (0.05)◆	0.046	TURBIDITY (5 s.u.)◆	1.2
COLOR (15 c.u.)◆	8	MERCURY	0.0007	ZINC (5.0)◆	0.020
		NICKEL	0.000		

◆ MANDATORY LIMIT ◆◆ RECOMMENDED LIMIT

ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER			
DISTRIBUTION #1	1	1	2,372
DISTRIBUTION #2	< 1	< 1	370

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE California
NAME OF AREA Stony Gorge
NAME OF SUPPLY Campground
DATE OF SURVEY 11/10/71
TREATMENT None

SOURCE Well
PUMP Jet pump
STORAGE Ground level storage tank

BACTERIOLOGICAL SURVEILLANCE Random sampling by County Health Dept. (1 to most part) does not meet sampling frequency rate of USPH

BACTERIOLOGICAL QUALITY - High standard plate count. At the time of survey, 1 sample contained coliform organisms. Bacteriological records showed 4 of 4 samples in the past 3 years containing coliform organisms.

CHEMICAL QUALITY
USPH MANDATORY LIMITS EXCEEDED None

USPH RECOMMENDED LIMITS EXCEEDED Total dissolved solids.

OPERATION, CONTROL & SANITARY DEFECTS
1. No sanitary well seal
2. Water shortages occur in the dry season.

COMMENTS 1. The frequency of bacteriological sampling should be increased to meet the USPH during the entire time the system is operational.

2. Should seek an extra source of supply to compensate for water shortages.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)• (0.05)••	< 0.005	COPPER (1.0)•	0.010	NITRATE (45)•	0.3
BARIUM (1.0)••	< 0.05	CYANIDE (0.01)• (0.2)••	0.0	pH	7.6
BORON (1.0)• (5.0)••	0.580	FLUORIDE (1.4 to 2.4)••		SELENIUM (0.01)••	0.004
CADMIUM (0.01)••	0.00	IRON (0.3)•	0.026	SILVER (0.05)••	0.00
CHLORIDE (250)•	11.5	LEAD (0.05)••	0.00	SULFATE (250)•	168.0
CHROMIUM (.05)••	0.00	M.B.A.S. (0.5)•	0.010	TOTAL DISSOLVED SOLIDS (500)•	330.0
COBALT	0.00	MANGANESE (0.05)•	0.040	TURBIDITY (5 s.u.)•	0.59
COLOR (15 s.u.)•	< 3	< MERCURY	0.0005	ZINC (5.0)•	0.060
		NICKEL	0.014		

• RECOMMENDED LIMIT •• MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	18,000
DISTRIBUTION #2	3	< 1	23,000

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE California
NAME OF AREA - Woolmoon
NAME OF SUPPLY - Recreation Area
DATE OF SURVEY - 11/15/71
TREATMENT - None

SOURCE - Well
PUMP - Jet pump
STORAGE - Ground level storage and pressure tank.

BACTERIOLOGICAL SURVEILLANCE - None

BACTERIOLOGICAL QUALITY - Good at time of survey

CHEMICAL QUALITY
USPH MANDATORY LIMITS EXCEEDED - None

USPH RECOMMENDED LIMITS EXCEEDED - Nitrate

OPERATION, CONTROL & SANITARY DEFECTS

COMMENTS A bacteriological surveillance program should be practiced in accordance with the USPH.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)• (0.05)••	< 0.005	COPPER (1.0)•	0.023	NITRATE (45)•	48.0
BARIUM (1.0)••	< 0.05	CYANIDE (0.01)• (0.2)••	0.000	pH	7.9
BORON (1.0)• (5.0)••	< 0.1	FLUORIDE (1.4 to 2.4)••		SELENIUM (0.01)••	0.002
CADMIUM (0.01)••	0.00	IRON (0.3)•	0.011	SILVER (0.05)••	0.003
CHLORIDE (250)•	11.5	LEAD (0.05)••	0.017	SULFATE (250)•	36.0
CHROMIUM (.05)••	0.00	M.B.A.S. (0.5)•	0.050	TOTAL DISSOLVED SOLIDS (500)•	368.0
COBALT	0.00	MANGANESE (0.05)•	0.00	TURBIDITY (5 s.u.)•	0.17
COLOR (15 s.u.)•	<3	MERCURY	< 0.0003	ZINC (5.0)•	0.18
		NICKEL	0.00		

• RECOMMENDED LIMIT •• MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	130
DISTRIBUTION #2	< 1	< 1	370

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE Nevada
NAME OF AREA Boulder City
NAME OF SUPPLY Boulder City
DATE OF SURVEY 11/16/71
TREATMENT Coagulation, sedimentation, filtration and chlorination

SOURCE Lake Mead
PUMP Power
STORAGE 4.0 MG

BACTERIOLOGICAL SURVEILLANCE 76 finished and 75 raw water samples in a year.

BACTERIOLOGICAL QUALITY No positive samples for either raw or finished over the period of a year; and none in this field test.

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED Total Dissolved Solids, Sulfate

OPERATION, CONTROL & SANITARY DEFECTS
Treatment records were adequate. However, no chlorine residual was found in the distribution system.

COMMENTS
1. It is puzzling that no positive coliform results have ever been found in the raw water samples. It is recommended that check samples be run by the State or local health department and/or review of bacteriological techniques be conducted.

2. Improvements should be made to obtain a 0.1 - 0.2 ppm residual at all parts of the distribution system and confirmed by regular measurements.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.12	NITRATE (45)*	3.1
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000	pH	7.7
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**	--	SELENIUM (0.01)**	0.005
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.024	SILVER (0.05)**	0.006
CHLORIDE (250)*	41.0	LEAD (0.05)**	0.00	SULFATE (250)*	322.4
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.026	TOTAL DISSOLVED SOLIDS (500)*	862.0
COBALT	0.00	MANGANESE (0.05)*	0.00	TURBIDITY (5 s.u.)*	0.37
COLOR (15 c.u.)*	< 5	MERCURY	< 0.0005	ZINC (5.0)*	0.005
		NICKEL	0.017		

*RECOMMENDED LIMIT **MANDATORY LIMIT — ALL VALUES ARE EXPRESSED FOR LISTED MINERAL CONSTITUENTS AS PARTS PER MILLION (PPM)

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	< 1	< 1	3
DISTRIBUTION #1	< 1	< 1	11
DISTRIBUTION #2	< 1	< 1	25
DISTRIBUTION #3	< 1	< 1	13
DISTRIBUTION #4	< 1	< 1	16

REPORT ON INDIVIDUAL WATER SUPPLIES
BUREAU OF RECLAMATION STUDY

STATE ARIZONA
NAME OF AREA Davis Dam
NAME OF SUPPLY Davis Dam
DATE OF SURVEY 11/15/71
TREATMENT Chlorination

SOURCE Lake Mohave
PUMP Power
STORAGE 365,000 gals.

BACTERIOLOGICAL SURVEILLANCE 30 samples per year

BACTERIOLOGICAL QUALITY Annual results show TNTC to have been exceeded in October 1970. High standard plate count in inspection sampling.

CHEMICAL QUALITY
PHS MANDATORY LIMITS EXCEEDED None

PHS RECOMMENDED LIMITS EXCEEDED Total Dissolved Solids, Sulfate

OPERATION, CONTROL & SANITARY DEFECTS Chlorine residual was not maintained in the distribution system.

COMMENTS
1. Improvements should be made to maintain chlorine residual of 0.1 - 0.2 ppm at all points in the distribution system; this should be regularly measured.

2. The bacteriological sampling rate should be increased to two per month.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	0.005	COPPER (1.0)*	0.005	NITRATE (45)*	1.1
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.00	pH	7.6
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**	--	SELENIUM (0.01)**	0.006
CADMIUM (0.01)**	0.00	IRON (0.3)*	0.059	SILVER (0.05)**	0.006
CHLORIDE (250)*	35.0	LEAD (0.05)**	0.010	SULFATE (250)*	333.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.030	TOTAL DISSOLVED SOLIDS (500)*	518.0
COBALT	0.007	MANGANESE (0.05)*	0.006	TURBIDITY (5 s.u.)*	0.7
COLOR (15 c.u.)*	< 5	MERCURY	< 0.0005	ZINC (5.0)*	0.030
		NICKEL	0.017		

*RECOMMENDED LIMIT **MANDATORY LIMIT — ALL VALUES ARE EXPRESSED FOR LISTED MINERAL CONSTITUENTS AS PARTS PER MILLION (PPM)

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	1	< 1	4,300
DISTRIBUTION #1	< 1	< 1	33
DISTRIBUTION #2	< 1	< 1	9,300

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION SYSTEM

STATE [illegible]
NAME OF AREA [illegible]
NAME OF SUPPLY [illegible]
DATE OF SURVEY 11/16/71
TREATMENT Chlorination

SOURCE Lake Mead
PUMP [illegible]
STORAGE 45,000 gals.

BACTERIOLOGICAL SURVEILLANCE 20 samples/year; analyses by Boulder City Treatment Laboratory.

BACTERIOLOGICAL QUALITY No positive coliform results in a year or in the inspection sampling.

CHEMICAL QUALITY

DWS MANDATORY LIMITS EXCEEDED [illegible]

DWS RECOMMENDED LIMITS EXCEEDED Total Dissolved Solids, Sulfate

OPERATION, CONTROL & SANITARY DEFECTS 1. Chlorine residual was not maintained in the distribution system. 2. Records were inadequate.

COMMENTS

1. Improvement should be made to maintain a chlorine residual of 0.1 - 0.2 ppm at all points in the distribution system; this should be regularly measured.
2. Samples should be increased to two per month. The bacteriological analytical procedure should be reviewed and double checked by the State or local health laboratory as mentioned in the Boulder City summary sheet.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.011	NITRATE (45)*	1.0
BARIUM (1.0)**	< 0.05	CYANIDE (0.01)* (0.2)**	0.000	pH	7.6
BORON (1.0)* (5.0)**	< 0.1	FLUORIDE (1.4 to 2.4)**	---	SELENIUM (0.01)**	0.006
CADMIUM (0.01)**	0.003	IRON (0.3)*	0.060	SILVER (0.05)**	0.000
CHLORIDE (250)*	41.0	LEAD (0.05)**	0.018	SULFATE (250)*	322.4
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.026	TOTAL DISSOLVED SOLIDS (500)*	775.6
COBALT	0.007	MANGANESE (0.05)*	0.006	TURBIDITY (5 s.u.)*	0.4
COLOR (15 s.u.)*	< 5	MERCURY	< 0.0005	ZINC (5.0)*	0.061
		NICKEL	0.017		

* RECOMMENDED LIMIT ** MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER	10	< 1	420
DISTRIBUTION #1	< 1	< 1	25
DISTRIBUTION #2	< 1	< 1	60

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION SYSTEM

STATE CALIFORNIA
NAME OF AREA Imperial Dam
NAME OF SUPPLY Camp System
DATE OF SURVEY 11/18/71
TREATMENT None

SOURCE Well
PUMP Power
STORAGE 30,000 gals.

BACTERIOLOGICAL SURVEILLANCE Once per year

BACTERIOLOGICAL QUALITY No contamination noted in samples taken.

CHEMICAL QUALITY

DWS MANDATORY LIMITS EXCEEDED None

DWS RECOMMENDED LIMITS EXCEEDED Sulfate, Total Dissolved Solids

OPERATION, CONTROL & SANITARY DEFECTS
Well appears to be adequately protected.

COMMENTS

1. Levels of TDS and sulfate appear to indicate that the well water comes principally from the Colorado River.

2. Bacteriological sampling should be increased to twice per month.

PHYSICAL AND CHEMICAL DATA					
ARSENIC (0.01)* (0.05)**	< 0.005	COPPER (1.0)*	0.019	NITRATE (45)*	1.8
BARIUM (1.0)**	0.04	CYANIDE (0.01)* (0.2)**	0.000	pH	7.7
BORON (1.0)* (5.0)**	0.131	FLUORIDE (1.4 to 2.4)**	---	SELENIUM (0.01)**	0.004
CADMIUM (0.01)**	0.002	IRON (0.3)*	0.048	SILVER (0.05)**	0.001
CHLORIDE (250)*	93.0	LEAD (0.05)**	0.018	SULFATE (250)*	470.0
CHROMIUM (.05)**	0.00	M.B.A.S. (0.5)*	0.013	TOTAL DISSOLVED SOLIDS (500)*	1178.3
COBALT	0.012	MANGANESE (0.05)*	0.006	TURBIDITY (5 s.u.)*	0.24
COLOR (15 s.u.)*	< 5	MERCURY	< 0.0005	ZINC (5.0)*	0.007
		NICKEL	0.021		

* RECOMMENDED LIMIT ** MANDATORY LIMIT ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED

BACTERIOLOGICAL RESULTS	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35° C - 48 hr.
RAW WATER			
DISTRIBUTION #1	< 1	< 1	9
DISTRIBUTION #2	< 1	< 1	73

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE California
NAME OF AREA Imperial Dam
NAME OF SUPPLY Imperial Dam
DATE OF SURVEY 11/18/71
TREATMENT Chlorination

SOURCE well
PUMP Power
STORAGE 50,000 gals.

BACTERIOLOGICAL SURVEILLANCE One sample per year

BACTERIOLOGICAL QUALITY High standard plate count, coliform and fecal coliform

CHEMICAL QUALITY
DHS MANDATORY LIMITS EXCEEDED None

DHS RECOMMENDED LIMITS EXCEEDED Total Dissolved Solids, Sulfate, Zinc, Turbidity

OPERATION, CONTROL & SANITARY DEFECTS 1. Chlorine residual was not maintained in the distribution system. 2. Inadequate records.

COMMENTS

1. Improvements should be made to maintain chlorine residual of 0.1 - 0.2 ppm at all points in the distribution system; this should be regularly measured.

2. The rate of bacteriological sampling should be increased to twice per month.

3. Regular records should be kept for chlorination, chlorine residual measurements, bacterial results, etc.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)o (0.05)oo	< 0.005	COPPER (1.0)o	0.047	NITRATE (45)o	1.4
BARIUM (1.0)oo	0.17	CYANIDE (0.01)o (0.2)oo	0.000	pH	7.5
BORON (1.0)o (5.0)oo	0.128	FLUORIDE (1.4 to 2.4)oo	--	SELENIUM (0.01)oo	0.001
CADMIUM (0.01)oo	0.000	IRON (0.3)o	0.32	SILVER (0.05)oo	0.000
CHLORIDE (250)o	34.0	LEAD (0.05)oo	0.001	SULFATE (250)o	237.0
CHROMIUM (.05)oo	0.00	M.B.A.S. (0.5)o	0.028	TOTAL DISSOLVED SOLIDS (500)o	1194.0
COBALT	0.000	MANGANESE (0.05)o	0.70	TURBIDITY (5 s.u.)o	2.2
COLOR (15 s.u.)o	5	MERCURY	< 0.0005	ZINC (5.0)o	5.2
FLUORIDE (1.4 to 2.4)oo	0.6	NICKEL	0.012		

o = RECOMMENDED LIMIT oo = MANDATORY LIMIT

ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	< 1	< 1	230
DISTRIBUTION #1	< 1	< 1	14,000
DISTRIBUTION #2			11

REPORT ON INDIVIDUAL WATER SUPPLIES

BUREAU OF RECLAMATION STUDY

STATE CALIFORNIA
NAME OF AREA Parker Dam
NAME OF SUPPLY Parker Dam
DATE OF SURVEY 11/17/71
TREATMENT Add coagulants, filtration and chlorination

SOURCE Lake Havasu
PUMP Power
STORAGE 500,000 gals.

BACTERIOLOGICAL SURVEILLANCE 3 samples per year

BACTERIOLOGICAL QUALITY No contamination shown

CHEMICAL QUALITY
DHS MANDATORY LIMITS EXCEEDED None

DHS RECOMMENDED LIMITS EXCEEDED Total Dissolved Solids, Sulfate

OPERATION, CONTROL & SANITARY DEFECTS No chlorine residual found near treatment point or in the distribution system; records were negligible or not available.

COMMENTS

1. Improvements should be made to maintain a chlorine residual of 0.1 - 0.2 ppm at all points in the distribution system; this should be regularly measured.

2. The rate of bacteriological sampling should be increased to twice per month.

3. Regular records should be kept for treatment operation, chlorine residual measurements, bacterial results, etc.

PHYSICAL AND CHEMICAL DATA

ARSENIC (0.01)o (0.05)oo	< 0.005	COPPER (1.0)o	0.014	NITRATE (45)o	1.3
BARIUM (1.0)oo	< 0.05	CYANIDE (0.01)o (0.2)oo	0.000	pH	7.8
BORON (1.0)o (5.0)oo	< 0.1	FLUORIDE (1.4 to 2.4)oo	--	SELENIUM (0.01)oo	0.004
CADMIUM (0.01)oo	0.00	IRON (0.3)o	0.025	SILVER (0.05)oo	0.00
CHLORIDE (250)o	34.0	LEAD (0.05)oo	0.00	SULFATE (250)o	350.0
CHROMIUM (.05)oo	0.00	M.B.A.S. (0.5)o	0.028	TOTAL DISSOLVED SOLIDS (500)o	811.3
COBALT	0.00	MANGANESE (0.05)o	0.00	TURBIDITY (5 s.u.)o	0.71
COLOR (15 s.u.)o	< 5	MERCURY	< 0.0005	ZINC (5.0)o	0.14
FLUORIDE (1.4 to 2.4)oo	0.6	NICKEL	0.015		

o = RECOMMENDED LIMIT oo = MANDATORY LIMIT

ALL VALUES ARE MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED

BACTERIOLOGICAL RESULTS

	COLIFORM/100 ml	FECAL COLIFORM/100 ml	S.P.C./ml 35°C - 48 hr.
RAW WATER	< 1	< 1	2,200
DISTRIBUTION #1	< 1	< 1	340
DISTRIBUTION #2	< 1	< 1	23